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shall then have an opportunity of examining the information to be elicited from our mediæval minstrelsy, and of bringing its illustrations to bear on history. Little progress, unfortunately, has been made in collecting and publishing the remains of the many oral poetic appeals, which once roused so powerfully the passions of our ancient countrymen. On this subject, the editor of *The Ballad Poetry of Ireland* makes a just remark, which we will now repeat and extend. When all our stores are gathered and arranged—when we can read every Ossianic tale and poem—understand the native ideas as expressed in verse and prose, from the Danish times to the Jacobite struggles, and compare them with the later ballads sung in the farm-houses of the colonist yeomanry—then “shall we have insights into the heart of history which a tower-full of State Papers would not afford.” At the same time, be it remembered, these State Papers afford assistance of inestimable value to the scrutinizing historian. The great pulsations of the Irish heart, the electric shocks of insurrection that frequently agitated the stormy atmosphere, and those tempests of human violence that often terminated in deluges of blood, are all recorded in the English registry of State, and that, too, by the hands of men whose wounds were rankling, and whose hearts were aching, while they wrote.

HERBERT F. HORE.

## --- PLOUGHING BY THE HORSE'S TAIL. ---

Several queries and remarks having appeared in this *Journal*\* respecting this once general but now, it is to be hoped, totally obsolete practice, I have been induced to put together the following notes, which may serve to throw some light on the subject.

In 1613, when a number of Irish noblemen, knights, and gentlemen, “shewed themselves before the king” with their grievances, the tenth grievance—under the heading of *Divers Disorders in the Kingdom of Ireland, committed by Martiall Men*—was as follows:—

“In the Northern Counties, the sheriffs, governors, marshals, & others do take, for permitting the inhabitants to use their short ploughs, after the rate of 10s. by the year for every plough, which is now come to be an exact revenue of extraordinary great value to these officers, to the great grief & impoverishment of the people, who have neither the skill nor means to use other ploughs; & until in those places the people were of more ability, this might be forborne, there being no law against that kind of ploughing.”

Besides being grievances, which were submitted to the king on this occasion, (and, indeed, several of them deserve the name,) the student of Irish history knows that they were also charges of misgovernment against Arthur, Lord Chichester, then Lord Deputy, amounting to something more

\* Vol. iii., 254; vol. iv., 171, 275; vol. v., 164, 267, 348; vol. vi., 134, 135.

† *Desiderata Curiosa Hibernica*.

than a mere expression of want of confidence in him as Vice-roy of Ireland. So Chichester, in his refutation, when replying to the above-quoted particular grievance, writes thus to the King:—

“There is nothing taken by these officers for permitting the people to use the short ploughs, as is alleged; but the truth is that, upon consideration had of the barbarous custom of drawing with their beasts by the rumps, whereby many hundreds are killed & maimed yearly, a proclamation was published about 7 years since, prohibiting that custom, which was a garran out of every plough so drawn, & if they drew their short ploughs with traces of ropes or withes, nothing was to be demanded. But this penalty was never levied according to the proclamation; but seeing the people had no care to alter that uncivil & disprofitable custom, thereunto animated, as it seems, by the justification of the complainants to keep them still barbarous, I gave orders to the sheriffs & other officers, about two years since, to take ten shillings out of every plough so drawn.”<sup>b</sup>

Seven years later, in the spring of 1620, the Irish people appointed “Agents,” as they were termed, to wait on the King, and acquaint him with their most pressing grievances. These agents were three in number—namely, the Lord of Devlin, Sir Christopher Plunkett, and Mr. Dongan, the Recorder of Dublin. The grievances were five, and merit enumeration. The first was the licensing system being applied to ale-houses; the second was the registry of marriages, christenings, and burials;<sup>c</sup> the third was a license being required for the manufacture and sale of aqua-vitæ; the fourth was the imposition of a fine for *ploughing by the horse’s tail*; and the fifth was the registry of horses, a measure introduced to abate the then very prevalent crime of horse-stealing. These five judicious measures, evidently passed for the benefit of the country, being innovations, were most distasteful to the Irish people. Moreover, the fees and penalties severally connected with each, were farmed out, by letters patent, to hungry court favourites, who—regarding the acquisition of money more than the carrying out of the law—by compounding with some and overcharging others, managed to squeeze large annual incomes out of the impoverished Irish; while the measures themselves, as respects their restraining and useful purposes, remained mere dead letters on the records of the Council Chamber.

The King, in a letter of instructions to Sir Oliver St. John, then Lord Deputy, (dated June, 1620,) states that he had heard the “Agents” with his “accustomed patience,” and then, proceeding to deal with the grievances *seriatim*, he says:—

“The barbarous custome commonly used in the Northerne parts was the cause of the grant of the penaltie for plowing with horses by the taitles, and our chiefest end thereby was the reformation of that abuse, which we were then assured would with few yeares be brought to passe, & we did presently see a good effect thereof in some parts of that country. But now, being informed by

<sup>b</sup> Ibid.

<sup>c</sup> In the Yorkshire rebellion of 1536, one of the proclaimed grievances of the 40,000 insurgents, headed by Makarel, Abbott of Burlings, who assumed the more

democratic name of Captain Cobler, was, that orders had been given for the registering of marriages, christenings, and burials.

the Agents that such as are employed under our Patentee, more respecting their owne proffit than our intention, have by way of contract drawne downe the 10<sup>s</sup> on every plough to 2<sup>s</sup> & 6<sup>d</sup>, & soe by lessening the punnishment, opened a way for that rude & hatefull custome to spread it selfe: This we would have you to examine, & if it shall appear unto you that any such course hath been held, soe far differing from our Royal purpose, we shall upon notice thereof, call in the said graunt, & take some sharper course for the most speedy reducing of the offenders into better forme.”<sup>a</sup>

In March, 1621, the King appointed a number of Commissioners to enquire and report on the state of Ireland. One branch of their inquiries was directed to “*the general grievances suffered by patents, granted under the Crown or otherwise;*” and under this head, in the following June, they report as follows:—

“The grant of the penaltie of 10<sup>s</sup>, to be imposed upon every man that should plough with his Horses by the Tayles, was to reforme a barbarous Custome, too frequently used in that kingdome, & your Ma<sup>tie</sup>’s chieftest end thereby was to take away that abuse. The Agents complained of that as a grievance, but the reasons for it” [for it being a grievance]. “we do not finde, more than that the assignees of the Patentee (as they alledged) had contracted with the offenders for a lesser Summe. And so the ill Custome was thereby rather continued than taken away. To this your Ma<sup>tie</sup>. was pleased to answer, that if the allegacion could be proved before your Deputie & Councell, you would call in the Patent, & reforme that lewd Custome by some sharper course. This, for ought we knowe, the Agents could not prove, & soe the Grant remaines as formerly it did. Which we cannot present as a general Grievance, being an Imposition laid onely upon some particular men for the Reformation of an Abuse. At which, if your people doe repine, it is rather because the Penaltie doth goe to a private hand, than for any other cause. Your Ma<sup>tie</sup>. may therefore be pleased, by giving some reasonable consideracion to the Patentee for his Interest, to convert the profits ariseing out of that Grant to your own use, soe long as that barbarous Custome shall continue. Which, being collected by your own Officers, & for the encrease of your Revenue, will be less offensive to the people than now it is.”<sup>a</sup>

The English Council Chamber appended the following *postill* or note to the preceding report:—

“The Patentee for this Imposition is to be compounded with for his Grant, & the King to take the profit of it into his own hands, who (by suing the Penalties) may either reforme that Barbarous Custome in few years, or much encrease his Revenue thereby.”

It appears, however, that the patentee was not compounded with in the exact manner proposed. He paid £100 per year for his grant, and the first year he held it (1612), it produced a gross sum of £870. In all probability then he would be wealthy, and, according to the corrupt custom of the period, might hold his patent as long as he chose to pay well for it. And that an arrangement

<sup>a</sup> Add. MSS. Brit. Mus. 4756.

<sup>a</sup> Ibid.

of this kind was made, there can be little doubt; for the Irish Commissioners, in a subsequent report to the King, write as follows:—

“The barbarous use of Ploughing with Garrons tyed by the Tayles was restrained by the Councell here. Afterwards the same was permitted, & a Mulet imposed of 10<sup>s</sup> for every short Plough, which forfeiture in Anno 1612 was granted to Sir William Udale, whose Patent is still in force. And where it was directed that the Patentee should be compounded with, & the same taken in to your owne hands, we find noething done in that kinde; but, by a Letter from the Lords of the Councell in England, yo<sup>r</sup>. Ma<sup>tie</sup>. requires the Deputie to give warrant to the Patentee to levy the Penalties as before: by which means this barbarous Custome of ploughing with Horses tyed by the Tayles is still continued in many places, for restraint whereof we find noe Law or Statute here in force.

“And the Countrie hath renewed their Complaints that this annual execucion of 10<sup>s</sup> for every short Plough hath, in many places, hurt and impoverished the Country; & by colour thereof, of some have been taken & extorted Money for their Harrowes (as we are informed); & of some of less abillitie, composicion made at less rates than the penaltie of 10<sup>s</sup> appointed (as was directly proved). So that the use of this Patent lends more to a private Gaine than to a Reformation: In regard whereof, & the due Consideration of the now scarcity of Corne, & the Poverty of this People, we conceive it fitt, that short Ploughs be tolerated till the first of Aprill & no longer; that in the meantime Men may furnish themselves with such Ploughs as are in use in England, or learn to use their short Ploughs, setting their Garrons three or four Horses affront, which is free from unseemliness, & siffer for some mountaines & boggish grounds than the long Plough, as is now begun & practized in the Barony of Clankie, in the Countie of Cavan, which we rather advise; because we have received credible Information that the Earle of Antrim, in the Countie of Antrim, where he hath diverse Baronies, hath bannished that barbarous Custome, by holding all his Tennants to the fashion of English plowing, & Sir George Hamilton hath already reformed his Tenants, & so others. And your Ma<sup>tie</sup>'s ayme appeareing by all the Acts to tend to Reformation of the Abuse, & to remove the barbarous Practise, Wee offer to your Ma<sup>tie</sup>'s. consideration, whether it were not fitt, that your Royal pleasure shall by a Proclamacion be published, inhibiting all your Subjects here, after the first day of Aprill next, from ploughing with Garrons or Bullocks tied by the Tayles, upon paine of your high displeasure, & such as shall offend, to be bound to their good behaviours till they reforme.”

In January 1623, Lord Deputy Falkland petitioned the English Privy Council to permit Udale, the patentee, to continue to collect fines for ploughing by the tail, and on the 8th March of the same year, he acknowledges the receipt of letters permitting fines to be continued.<sup>5</sup>

On the 4th May, 1628, Falkland, writing from Dublin to Viscount Conway, says:—“We abound in wants and calamities of all sorts. Noe fortiffeacions in state of defence: noe armes, noe munitions, noe armye; an infinite mortalitie of cattle, dearth of corne presently sustayned, famine and pestilence threatened to ensue.” And further tells us that he had issued a proclamation commanding every one to fast one whole day in every week for two months!<sup>6</sup> At this juncture, the Irish people again sent over Lord Killeen, Lord Poer, and others, as agents to petition relief from several oppressive laws. Charles received them graciously, ordered their expenses to be paid by the nation, and granted or relaxed the whole fifty-one articles of complaint of the Irish people, which

<sup>5</sup> Ibid.  
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Irish Papers. State Paper Office.  
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<sup>6</sup> Ibid.

then and since have been technically termed "the fifty-one Graces." One of those articles of complaint was the fine for ploughing by the tail, and Charles in his private letters to the Lord Deputy thus alludes to it:—"For reforming of the barbarous abuse of the short ploughs, wee are pleased that the penalty now imposed thereon shall be presently taken away; and that hereafter an Act of Parliament shall pass for the restraining of the said abuse upon such penalty as shall be thought fitt."<sup>i</sup>

In 1634 an act was passed by the Irish parliament prohibiting ploughing by the tail, and another custom of pulling the wool off live sheep, instead of shearing them; and subsequently, in the same session, another act was passed prohibiting the use of the "fiery flail," as it was termed, or in other words, burning the straw instead of threshing out the corn. The preamble to the first mentioned act recites as follows:—"Whereas in many places of this Kingdom, there hath been a long time used a barbarous custom of Plowing, Harrowing, Drawing, and Working with Horses, Mares, Geldings, Garrans, and Colts, by the Taile, wherebye (besides the cruelty used to the Beasts) the Breed of Horses is much impaired in this Kingdom, to the prejudice thereof, &c."<sup>j</sup>

Acts of Parliament, however, merely relating to industrial and social progress, have but little effect among people utterly destitute of the simplest elements of material or intellectual civilisation. In 1777, Young found the three barbarous and unprofitable practices—plucking the wool, ploughing by the tail, and burning the straw—the common practice in the county of Mayo. In Cavan, Young says:—"They very commonly plough and harrow with their horses drawing by the tail; it is done every season. Nothing can put them beside this, and they insist that, take a horse tired in traces, and put him to work by the tail, he will draw better; quite fresh again. Indignant reader, this is no jest of mine, but cruel, stubborn, barbarous truth! It is so all over Cavan."<sup>k</sup>

The practice was common as late as the earlier part of the present century. Wakefield, who travelled in Ireland in 1809, says:—"In Roscommon I heard of horses being yoked to the plough by the tail, but I had not an opportunity of seeing this curious practice. I was, however, assured by Dean French, that it is still common with two-year-old colts in the spring. And the Rev. Mr. Elliot, a clergyman of the Established Church in Ireland, who has a living at Pettigo, in the county of Fermanagh, said he had seen it in his parish in the spring of 1808."<sup>l</sup>

From the above, and numerous other notices of ploughing and harrowing by the tail, in Scotland as well as in Ireland, there can be no doubt that the practice existed in both countries from time immemorial down to, comparatively speaking, a very late period. Indeed, for myself, I have, when young, heard three persons at least, all of unimpeachable veracity, speak of having witnessed the barbarous practice.\*

<sup>i</sup> S.P.O.

<sup>j</sup> *Collection of Acts and Statutes at large.* Dublin: 1684.

<sup>k</sup> *A Tour in Ireland.* London: 1780.

<sup>l</sup> *An Account of Ireland.* London: 1812.

\* The practice of drawing by the horse's tail still exists in some parts of Ireland, or did about a dozen years ago, when Otway published his tours in Connaught. In his *Sketches in Erris and Tyrrawley*, (1845,) he gives the

With respect to the furrows on the tops of hills, noticed by Mr. O'KEEFE, in this *Journal*, [vol. v. p. 164,] I cannot for a moment suppose they had been caused by a plough; and I also must dissent from Mr. O'Keefe's assertion that the Irish race of horses was a fine one, although there may be many passages in Irish literature and the Brehon laws, descriptive of a good horse. The goodness of horses, like that of every thing else, is merely comparative. What might have been considered a very fine horse in Ireland, might have been esteemed a very inferior one in England. The English, in Elizabeth's time, did not condescend to give the name of horse to the Irish and Scottish specimens of the equine race, but contemptuously termed the former "hobbies," and the latter "prickers." And speaking of Scottish horses reminds me that, according to a passage in the works of Æneas Sylvius—Papal Nuncio to the courts of James I. and II. of Scotland, and subsequently Pope himself, under the title of Pius II.—the Scotch, in the earlier part of the fifteenth century, *had not acquired the art of riding*, and, having no wheeled vehicles, merely used their horses to carry small loads upon their backs. The English, from their contiguity to the Continent, had ampler means of improving their horses, by crossing with foreign breeds; and the necessity of having strong animals to carry men clothed in the heavy armour of the mediæval period, caused the English not only to increase and improve, but also to keep their horses to themselves as much as possible. As early as the reign of Athelstan, horses were forbidden to be exported to foreign countries. The statute-book is full of laws for improving the breed, and restraining the exportation of English horses. In the time of Henry VIII. an act was passed forbidding any man, whose position in society allowed his wife to wear a velvet bonnet, from riding a horse under fifteen hands in height. By another act, all "unlikely tits" (unpromising foals) were to be killed. And even as late as the reign of Elizabeth, a law was passed making it felony, without benefit of clergy, to take an English horse into Scotland, for the purpose of selling it. So it is highly probable that the steed

following letter from a resident in Erris, who had for many successive years witnessed the practice:—

"In justice to those who continue the practice of *harrowing by the tail*, I beg to observe that, as far as cruelty is concerned, I really can see no objection to it; for, if you gave the animals any pain, I do not think they would submit to it so quietly as they do: indeed there are people who assert it to be the most *humane* way of doing the work! In proof of which I need only relate the following anecdote. I was on my way to dine with a worthy old gentleman, who resided here on my first arrival (now seventeen years ago), when I first observed the practice, and, as was natural for a foreigner, could not find words sufficiently strong to express my feelings at the cruelty of the thing. 'I beg your pardon,' said my host, 'you are quite mistaken, for I assert, and I feel I will force you to agree with me in opinion, that it is the most humane way of working the beast; for this reason, that he harrows with less exertion.' 'Impossible!' replied I. 'I will prove it to a sailor with ease,' answered the gentleman:—'pray, when you anchor your ships, why

do you give them a long scope of cable when it blows hard?' 'Because,' said I, 'the hold the anchor has of the ground is in an increased ratio to the sine of the arc the cable makes with the ground' I know nothing about your *sines*,' replied the old gentleman, laughing, 'though I believe I understand what you mean. Now, if you give a long scope of cable to increase the resistance, does it not stand to reason that a short scope must have a contrary effect? And therefore, must not harrowing by the tail be easier to the animal, inasmuch as the harrow-rope is shortened by the whole length of the horse?' My host chuckled with delight, and seemed to consider this argument a 'floorer;' and my 'But, my dear Sir, there is a vast difference between securing a cable to the *"bits,"* and making it fast to the *"rudder-pintles,"*' neither diminished his glee, nor induced him to change his opinion. He continued the practice to the day of his death: and up to last year (1889) it *was*, and next year, I feel assured, it *will be* followed. It is hard to break a custom attended with no expense."

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which M<sup>c</sup>Murrough rode, [*Journal*, vol. v. 164,] was an English horse, smuggled out of England, or sold to him by some of the pale's-men; and its high price (400 cows), instead of shewing the goodness of Irish horses, proves, on the contrary, the extreme rarity of good horses in Ireland. Again, Mr. O'Keeffe also errs when he values an Irish cow in M<sup>c</sup>Murrough's time at three pounds. I have before me an account of the seizure, appraisement, and sale, by the sheriff of Fermanagh, at Enniskillen, in 1622, of sixteen Irish cows, which fetched only nine pounds: at the same time, however, English cows, that is of the breed introduced by the "planters" of Ulster, sold for three pounds each. This very high price, for the period, was caused merely by the rarity of the breed; for in 1642, when the English breed had increased and multiplied, I find in the treaty made between the Marquis of Ormond and the Commissioners authorised by the Council of Kilkenny, that a sum of £7000 was to be paid to Charles I. in good beeves, at the value of £30 per score. By good beeves none other could be meant than the English breed, and even then they were worth only thirty shillings each. Indeed, I question if the Irish, or "Kerry" cow, as it is now termed (for, having lost its general appellation, it has acquired a local one,) was ever at any period worth three pounds, except as a curiosity.

Another correspondent, under the name of GEORGE [*Journal*, vol. iv. 98] asks if the Irish at an early period shod their horses? I reply that they did not; for people without either roads or wheeled carriages have no necessity for horse-shoes. On the pampas and prairies of the new world, and on the steppes of Central Asia, horse-shoes are unknown, simply because not required. The ancient Greeks did not shoe their horses. Homer, indeed, describes the horses of the car of Neptune as being "brazen-footed;" but that is merely a poetical epithet, like "brazen-lunged," or "brazen-faced." Xenophon, in his treatise on the management of the horse, says nothing about a shoe, though he gives minute directions for taking care of the horse's foot, and for preserving and hardening the natural hoof. The Romans, however, used shoes, or rather a kind of leather socks, faced with iron, which were fastened round the legs of the horse with cords made of a species of *spartum* or broom, supposed to be the *stipa tenacissima* of modern botanists. These shoes were used only in rough places, and could be taken off or put on by any person in a very short time, and with very little trouble, as we learn from a curious passage in Suetonius' life of Vespasian.<sup>m</sup> At what period the modern shoe, that is nailed to the hoof, came into use is unknown; the earliest specimen of it is one found in the coffin of Childeric of France, who died in 481.<sup>n</sup> The Normans introduced the horse-shoe to England. The Scotch first began to shoe their horses about 1480.

According to the records of the Guild of Hammermen of Edinburgh, the essay, or trial of skill, which every candidate for the honours of membership had to perform, was, in 1584, to make "ane

<sup>m</sup> Mulionem in itinere quodam suspicatus a calciandas mulas desiliisse, ut adeunti litigatori spatium moramque

præberet: interrogavit quanti calciasset: pactusque est lucri partem.

<sup>n</sup> Montfaucon. *Monumens de la Monarchie Française*.

horse shoe & sax nailes thereto.”<sup>a</sup> From this we may reasonably draw two inferences. First, that horse-shoes were but seldom made in Scotland at that time; and secondly, that the Scotch horse was then much smaller than it is now, when eight nails are required to fasten the shoe. The practice of shoeing horses did not come into general use in Scotland till the last century.

I had thought my task was over, but the welcome arrival of the last number of this *Journal* induces me to say a few words more. I see that Dr. O'Donovan holds it impossible that even six horses could draw a plough, if yoked by their tails. I can see no difficulty in the matter; and I believe that the Irish generally used but one or, at most, two horses for ploughing with, and fastened by their tails alone. The question is not, as Dr. O'Donovan says, “what ploughing by the tail means;” this, I think, has been sufficiently shown in the present paper; but the question is, how was it managed? and to that I can only give a speculative answer, but one however, probably not far from the truth.

It will be observed that the penalty, though inflicted on ploughing by the tail, was imposed on the *short* or *Irish* plough, thereby implying that that mode of ploughing could not be effected by the *long* or *English* plough. Still, as we see from the Lord Deputy's letter, “if they drew their short ploughs with traces of ropes or withes, no penalty was demanded.” What, then, was the short plough like? Who knows? I do not. But as there is a strong general resemblance among the agricultural implements of all primitive races, if we can find a plough used from the earliest antiquity down to the present day, by various peoples in different and widely separated parts of the world—a plough, too, that could be drawn without any other gear or harness than merely being fastened to the horse's tail, we may conclude that we have fallen on an implement differing little from the “short plough” of the Irish. Now such a plough, used by the ancient Egyptians some 3000 years ago, is depicted on the tombs of Beni Hassan and the catacombs of Thebes; and an exactly similar plough, used by the Romano-Britons, is represented by a bronze found at Piercefield, in Yorkshire, and now in the collection of Lord Londesborough.

The most familiar description I can verbally give of this ancient and general type of plough, is simply this. Let the reader imagine a large pick-axe, with one arm of the pick (to which the share is attached) stuck in the ground; while the other or upper arm of the pick, bent slightly back, forms the handle of the plough. The handle of the pick elongated forms a draught-pole, which, passing between two oxen, was fastened to the yoke,—and thus no traces or harness whatever were required.

But besides the bronze statuette above alluded to, we have Virgil's description, in his first *Georgic*, of the Roman plough:—

“Continuo in silvis magnâ vi flexa domatur  
In burim, et curvi formam accipit ulmus aratri.

<sup>a</sup> *Transactions of Society of Antiquaries of Scotland.* Vol. 1.

Huic à stirpe pedes temo protentus in octo,  
 Binæ aures, duplici aptantur *dentalia* dorso.  
 Cœditur et tiliæ ante iugo levis, altaque fagus,  
 Stivaque, quæ currus à tergo torquent imos;  
 Et suspensa focis explorat robora fumus."

Which may be briefly translated thus:—An elm tree, bent with great force, is formed into a *buris* (the lower arm of the imaginary pick-axe), and receives the shape of the crooked plough; to it are fitted the *temo* (draught-pole, or handle of pick-axe), stretched out eight feet, the two *aures* and the *dentalia* (share and mould-boards), with the double back and the *stiva* (handle of the plough, or upper arm of the pick), which bends the lower part of the plough behind.—There can be no doubt about the respective positions of those parts of the Roman plough. Varro tells us that when the *buris* was broken, the share was left in the field." Valerius Maximus relates how, when Attilius Serranus laid down the rod, he was not ashamed to grasp the *stiva* or handle of the plough.<sup>q</sup> Varro also derives *stiva* from *stando*, and says that a small cross-bar, called the *manicula*, passed through it, which the ploughman held in his hand;<sup>r</sup> and the same author also deduces *temo* from *tenendo*, because it held the yoke.<sup>s</sup>

An implement so light as the ancient plough, required great care and exertion on the part of the ploughman, who was compelled, by leaning on it, to load it with his own weight, so as to prevent its being pulled out of the ground altogether; and thus gave origin to the Roman adage, recorded by Pliny:—*Arator nisi incurvus prævaricatur*. I have not the original by me, but quaint old Philemon Holland translates the passage thus:—"The ploughman, unless he bend and stoop forward with his body, must needs make sleight worke, and leave much undone as it ought to be; a fault which in Latin we terme Prevarication: and this term appropriate to Husbandrie, is borrowed from thence by Lawyers, and translated by them into their courts and halls of pleas: if it be then a reproachful crime for lawyers to abuse their clients by way of collusion, we ought to take heed how we deceive and mock the ground."

In this sense, the Irish decidedly "deceived and mocked" the ground. As late as the beginning of the present century, the people of Cork believed that much or deep ploughing *weakened* the land;<sup>t</sup> and even then they still carried out their old practice of sowing barley, oats, and wheat "under the plough," (as they termed it,) that was, scattering the seed on the untilled ground previous to ploughing; a practice of the highest antiquity, for, in the Egyptian paintings already referred to, we see the sower in advance scattering the seed, followed by the ploughman turning over the soil.

<sup>p</sup> "Terram boves proscindere nisi magnis viribus non possunt, et sæpe fracta bura reliquant vomeres in arvo." *De Re Rustica*.

<sup>q</sup> "Nec fuit in rubori eburneo scipione deposito, agrestem stivam aratri repetere."

<sup>r</sup> "Supra id regula quæ stat, stiva a stando, et in transversa regula, manicula, quod manu bubulci tenetur,

qui quasi est temo inter boves."—*De Lingua Latina*. Lib. iv.

<sup>s</sup> "Temo dictus a tenendo, is enim continet jugum." —*De Lingua Latina*. See also last note.

<sup>t</sup> *Townsend's General and Statistical Survey of the County of Cork*.

But, I may be asked, how were horses guided when ploughing by the tail?—and this is scarcely the least strange or least barbarous part of the matter. A man armed with a stick walked backwards before the horses, and directed their movements by *beating them on the head*. Young, when speaking of ploughing by the tail in Mayo, says:—"The fellow who leads the horses of a plough, walks backwards before them the whole day long, and *strikes them in the face*."<sup>n</sup> Mr. Robertson, in *Observations and Facts on the Breed of Horses in Scotland*, published in the *Transactions of the Society of Scottish Antiquaries*, in 1792, coolly alludes (as if nothing uncommon) to "the awkward custom of yoking horses by the tail, and the driver of harrows walking backwards, with his face directly turned to the horses." In 1809, when ploughing by the tail was almost obsolete, the old custom of directing horses was still kept up. Wakefield saw, in Sligo, a harrow drawn by four horses abreast, directed by a man walking backwards, who kept continually beating them on their heads. It is clear, too, that when ploughing by the tail, the wretched animals were ranged abreast, their tails being fastened to a cross-bar placed at the end of the draught-pole.

W. PINKERTON.

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## NOTES ON THE HUMAN REMAINS DISCOVERED WITHIN THE ROUND TOWERS OF ULSTER, &c., &c.

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By JOHN GRATTAN.

(*Continued from page 37.*)

"'Tis time to observe occurrences, and let nothing remarkable escape us; the supinity of elder times hath left so much in silence, or time hath so martyred the records."—SIR THOMAS BROWNE, *on Urn-Burial*.

"The question of the fixity of all or any of the characters by which the races of mankind are at present distinguished from each other, requires for its solution a comparison of the present with the past. No valid proof of their permanence can be drawn from the limited experience of a few generations; and no evidence of change can be reasonably looked for, except under the long-continued agency of modifying causes."—CARPENTER, *on the Varieties of Mankind*.

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### D R U M B O .

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The circumstances connected with the examination of the round tower of Drumbo having been fully detailed by Mr. Getty in a previous number of this *Journal* [vol. 3, p. 113], it is unnecessary to recapitulate them here. It will be sufficient to state that, at a depth of seven feet from the surface of the material which filled up the base of the tower, and embedded, "*fossil-like*," in the natural soil upon which the tower stood, the greater portion of a human skeleton was

<sup>n</sup> *A Tour in Ireland*.

discovered, so situated as to leave no doubt upon the minds of the observers that it must have been deposited therein when the building was in course of erection. The skeleton lay in the direction of east and west, its several bones occupying their proper relative positions, and the head being towards the west. The bones of the right arm and of both the lower extremities were absent, whether in consequence of the body having been partially dismembered previous to its interment, or owing to subsequent decay, it was impossible accurately to determine; although appearances seemed, rather of the two, to favour the former supposition, as the condition of the remaining bones rendered it scarcely probable that so large an amount, and such important portions, of the skeleton could have been so completely destroyed by decomposition as to leave no trace of their having existed. The remainder of the skeleton, more or less decayed according to the original density of the several bones, bore testimony to its having belonged to a man of large and powerful frame, probably from 6 feet to 6 feet 2 inches in height: the head and trunk, measured *in situ*, being 2 feet 5 inches long, and the femur, or thigh-bone, 1 foot 10 inches; giving 4 feet 3 inches as the length from the crown of the head to the extremity of the knee; to which 1 foot 10 inches or 1 foot 11 inches may be added as the proportionate length of the leg and heel. The skull, considering the great length of time it must have been in the earth, was in a singular state of preservation. The nasal and turbinated bones, the interior and inferior walls of the orbits, and almost the entire of the zygomatic arches had been destroyed; not in consequence of decay, but apparently, from injury inflicted during its disinterment, the bones of the face having been separated from their attachments, and requiring to be artificially replaced and secured. The front teeth of the upper jaw had likewise been displaced by violence, their alveolar sockets broken away, and 4 of them lost—only 11 remaining, whilst but one appeared to have been removed during life. The lower jaw was partially decayed in some places, but otherwise uninjured, and contained its full complement of teeth. These were much worn down by attrition, particularly the molars or grinders, one of which was more than half destroyed by *caries*. For the remainder of the skull, (the *calvarium*, or brain-box proper,) it retained all the characteristics of recent bone, not having parted with any of its gelatinous constituents; and continued to exhibit, particularly in the frontal region, a more than usual hardness and density—the sutures being almost entirely consolidated by osseous union, but not so obliterated as to prevent their position being accurately determined. The state of the teeth and skull, conjointly, justify the conclusion that the individual to whom they belonged must have lived to an advanced age, probably 70, or thereabouts; whilst the condition of the skull itself countenances the inference that it had been tenanted to the last by an active and vigorous brain. The following are its principal measurements:—

|                                            | Inches. |
|--------------------------------------------|---------|
| Cubic capacity, - - - - -                  | 98      |
| Greatest length from 10 degrees, - - - - - | 7.5     |
| "    breadth, - - - - -                    | 6.2     |
| Circumference, - - - - -                   | 21.6    |

|                                  |   |   |   |   |   |   |     |         |
|----------------------------------|---|---|---|---|---|---|-----|---------|
| Frontal arch,                    | - | - | - | - | - | - | -   | Inches. |
| Parietal, "                      | - | - | - | - | - | - | -   | 5.5     |
| Occipital, "                     | - | - | - | - | - | - | -   | 5.1     |
| Sum of do., or Occipito-frontal, | - | - | - | - | - | - | -   | 4.9     |
| Mastoidal, "                     | - | - | - | - | - | - | -   | 15.5    |
| Proportional length and breadth, | - | - | - | - | - | - | 1.0 | 16.0    |
|                                  |   |   |   |   |   |   |     | .83     |

The remainder of the proportional measurements are given in Table 1, at the end of this article.

If the reader will now so far anticipate our inquiry as to turn to those Tables, he will there find what, most probably, will appear to be, at first sight, a confused and incomprehensible array of figures, but which, nevertheless, when classified, and reduced into proper tabular forms, yield the following demonstrable general results:—1stly, that amongst the 104 skulls therein recorded, whose length and breadth have been accurately measured, individual specimens are to be found, of every variety of length, from  $6\frac{1}{16}$  inches, the lowest, up to  $8\frac{2}{16}$  inches, the highest;—that, in like manner, their breadths vary from  $5\frac{1}{16}$  inches to  $6\frac{2}{16}$  inches; and that these varieties are not thrown confusedly together, in irregular quantities, but appear to group themselves in obedience to some controlling law or order of arrangement, which will more fully develop itself as we proceed;—and that, of 50 skulls whose cubic capacity has been ascertained, a similar divergence, subject to similar control, may be observed within the limits of 75 and 107 cubic inches:—2ndly, that, of 26 skulls, whose proportional measurements have been carefully determined, upon the plan propounded in the introductory portion of this article (page 33 *et seq.*) the culminating point of each, measuring from the auditory axis, is at 90 degrees from the naso-frontal suture, with three exceptions only [see the table of proportional measurements in the present number, and the previous one at page 38], which, as the difference in each exception amounts to .005 only, or the  $\frac{1}{200}$ th part of their respective long diameters, can scarcely be considered to affect the general rule;—that this radial line, which constitutes, therefore, the true index of the height of the head, ranges from 60 to 73 one-hundredths of the long diameter of the several skulls;—and consequently, that, as the other perpendiculars of the skull, within certain limits, approximate towards or depart from this standard, so will its respective portions be relatively high or low:—lastly, that from these numerical data are deducible various numerical averages, which can be employed as standards of comparison, by whose aid the hitherto vague and indefinite terms of *large* and *small*, *long* and *short*, *broad* and *narrow*, *high* and *low*, acquire, in relation to this particular subject of investigation, a more precise and intelligible meaning.

Tested by these criteria, the Drumbo skull proves to be one of very considerable size. In cubic capacity, it is only 4 inches below that of Spurzheim;\* and, though it does not approach within

\* At the instance of Edmund A. Grattan, Esq., her Britannic Majesty's Consul at Boston, U.S., the writer has been favoured with the following communication from Dr. J. Mason Warren, of that city, in consequence of  
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which he has been enabled to fill up the blanks left in the column of measurements, under the head of Spurzheim, at page 32; and he avails himself of this opportunity to tender to each of these gentlemen his respectful

11 inches of our Celtic extreme, it exceeds the Celtic average by  $6\frac{6}{10}$  inches. It is *absolutely* long, being only one-tenth of an inch shorter than Spurzheim's; whilst it exceeds the European average of Professor Van der Hoeven<sup>b</sup> by 0.46 inches, and the Celtic average by 0.24 inches, although the Celtic extreme exceeds it by 0.5 inches. Its breadth is very great, for, though inferior to Spurzheim's by 0.2 inches, it exceeds the European average by 0.73 inches, and the Celtic average by 0.75 inches; whilst its proportional length and breadth ( $1.0 \times .825$ ) place it upon the proportional scale .015 above the highest, .073 above the average, and .175 above the lowest of the Celtic group; and it exceeds the European average by .035. It is scarcely of average height, being only .65 of our scale,<sup>c</sup> which elevation it nearly attains at 40 degrees, and carries with it to 90 degrees, giving a full regular curve to the crown of the head, the transverse curves of which, however, are rather low and flat. Anteriorly to 40 degrees, the frontal bone is broader, but not more prominent than the average; and posteriorly to 90 degrees, the parietal and occipital bones keep throughout rather within the average.

The temporal bones, however, are remarkably prominent, the whole temporal zone projecting far beyond the juxta-temporal, so as to give to the entire head a well-marked globular form, which clearly and unmistakeably characterises it as *non-Celtic*—a circumstance of considerable ethnological interest, when considered in connexion with the date and character of the building in which it was

acknowledgments, for their very obliging and prompt compliance with his request:—

"Boston, February 18, 1858.

DEAR SIR,—Mr. E. A. Grattan has conveyed to me your request in regard to the measurements of the head of Dr. Spurzheim, which is in my possession. There has been some delay in doing this, owing to the skull being with my anatomical collection and not at my house, and more particularly from its having been, for the sake of preservation, very carefully mounted and enclosed in a glass-case, from which it has been necessary to displace it. The head had also been sawed through, not only horizontally but also vertically, making it a somewhat hazardous matter, for fear of injuring it, to fill it with shot. This, however, I have safely accomplished by first burying it in sand, tightly packing it down, and then pouring in the shot. Even in this way, I found much care necessary to prevent it from opening, and the shot escaping through the points of junction. I send a specimen of the shot used, also the weight of the shot in avoirdupois. The cubic capacity has also been measured by an instrument belonging to our Society of Natural History, invented by Dr. Shortliffe, who made the cast which you have.

It will afford me great pleasure to give you any farther information which lies in my power.

I am, very truly, &c.,

J. MASON WARREN."

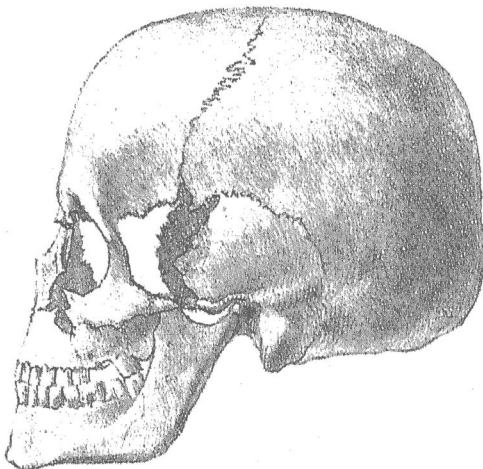
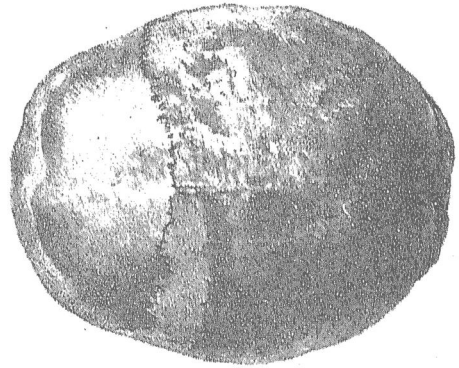
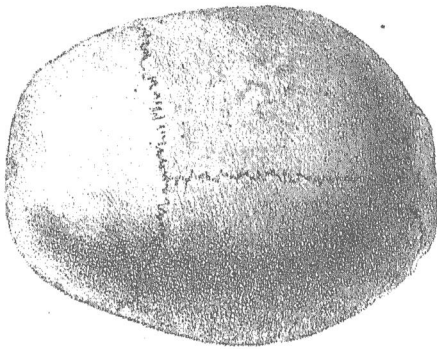
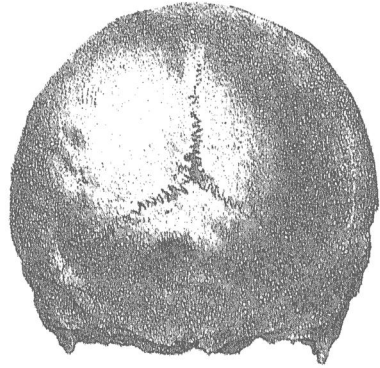
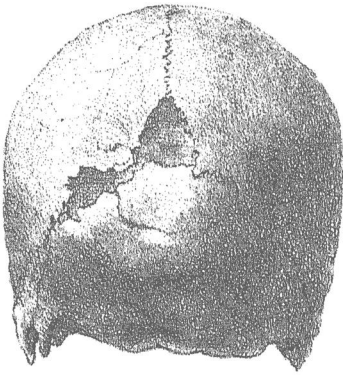
JOHN GRATTAN, Esq.  
Belfast.

From the information thus obtained, the following blanks can now be filled up:—

|                                    | Inches. |
|------------------------------------|---------|
| Cubic capacity, - - - -            | 100     |
| Occipital arch, - - - -            | 4.7     |
| Occipito-frontal do., - - -        | 15.5    |
| Mastoid al do., - - - -            | 16.0    |
| Long diameter of Foramen Magnum, - | 1.6     |
| Transverse do., - - - -            | 1.3     |
| Angular position of do., - - -     | 130°    |

<sup>b</sup> This is quoted from Dr. Carpenter's article upon the varieties of mankind—*Cyclopedia of Anatomy and Physiology*, page 131. The dimensions there given, upon the authority of Professor Van der Hoeven, of Leyden, as the average of the European skull, are 7.04 inches by 5.47 inches, which would be equivalent to  $1.0 \times .79$  upon our proportional scale. As the average has been deduced, however, from only 20 skulls, without any intimation of the races they represent, it cannot be accepted without considerable caution, inasmuch as, even in our Celtic group of 75 skulls, we find the length to range between the extremes of 6.9 and 8.0 inches. Twenty specimens, therefore, could not possibly furnish a correct criterion of the average of the complicated population of Europe, nor, indeed, contain even one representative of each.

<sup>c</sup> It may be well to remind the reader, that the proportional scale here referred to, is, as explained at page 33, the long diameter of each skull, divided into 100 equal parts—by employing which, the subordinate measurements of every skull are expressed in decimal subdivisions of its actual length.



WILSON  
Nº2



DRUMBO

discovered. For this reason, and as it exhibits strong typical peculiarities, three views of it, reduced to one-third lineal measurement, are given in plate 1.

In Dr. Petrie's work upon the Round Towers of Ireland, these structures are proved by him to be of Christian and ecclesiastical origin, and to have been erected at various periods between the fifth and thirteenth centuries; and at page 398, the architectural peculiarities of Drumbo are thus specially referred to, as indicating it to have been one of the very earliest erected:—"The oldest towers are obviously those constructed of spawled masonry and large hammered stones, and which present simple quadrangular and semi-circular arched door-ways, with sloping jambs, and little or no ornament, perfectly similar to the door-ways of the earliest churches. As an example of the quadrangular door-way, with inclined jambs and large lintel, I have given on the preceding page an illustration of the door-way of the Round Tower of Drumbo, in the county Down." If such be the case—and that it is so, appears to be now determined beyond all reasonable doubt—it follows that the cotemporaneous skeleton discovered within its walls, legitimately lays claim to an antiquity approaching to fourteen hundred years: a step backwards into the past which brings us to something near the time when England, deserted by her Roman masters, was struggling in vain to stem the torrent of Saxon invasion, pre-destined to exercise so large an influence upon her subsequent career; and to some six or seven hundred years before the first Anglo-Norman invaders, under Fitzstephen, had set foot upon our Irish soil:—circumstances which invest with exceeding interest this time-consecrated relic of mortality, thus authentically identified with so remote a period of our country's history.

The question has indeed been raised by some, even amongst those who admit the validity of Dr. Petrie's evidence and the soundness of his archæological inferences, as to whether the human remains discovered within the Round Towers are coeval with them, or have been subsequently introduced; and Dr. Wilde, too high an authority in such matters to permit of his opinion being passed over in silence, thus discusses the subject in his *Beauties of the Boyne and Blackwater*, page 235:—

"Mr. GERRY of Belfast has been very industrious in the collection of ancient Irish remains; and the Belfast Museum at present contains several specimens of old Irish heads. This leads to another locality in which bones of the ancient Irish people are said to have been found. We allude to the Round Towers, particularly to that lately excavated at Drumbo, in the county of Down, beneath which some bones were found. Interest was excited by this discovery, from the supposition that these human remains would offer some clue as to the origin and uses of these monuments, or assist in determining the probable era of their erection. The enchanted palace of the Irish round tower has, however, been opened for our inspection, and therefore all theorizing on the subject is at an end. We were presented at the time of the examination with a very beautiful cast of the skull found within the round tower of Drumbo; and the moment we saw it we felt convinced that, if it was of a cotemporaneous age with the structure beneath which it was found, then the Irish round tower was not the ancient building it is usually supposed to be; for, compared with the other Irish heads, that skull is of comparatively modern date. Now, nearly all the round towers are in connection with ancient burial-places, and that one in particular

is so, and one need only dig around and without it to find many similar remains. We hear that the skeleton was found at full length imbedded in the clay, within the ancient structure. Now, if the round tower was erected as a monument over the person whose skeleton was found within, the body certainly would not have been buried thus in the simple earth, without a vault or stone chamber, such as the enlightened architects who built the tower would be thoroughly competent to construct. Moreover, we do not believe that a skull thus placed loosely in the earth, without any surrounding chamber, would have remained thus perfect for the length of time which even the most modernizing antiquaries assign as the date of the round tower.

If the writer might presume to express, with considerable diffidence, an opinion upon a disquisition which his limited attainments only enable him partially to appreciate, he would entirely agree with Dr. Wilde as to the conclusiveness of Dr. Petrie's researches, and the complete removal, by the publication of his work upon the "Round Towers of Ireland," of all room for further speculation upon their origin and uses. To a great extent, likewise, he must coincide with Dr. Wilde himself as to the archaeological inference to be drawn from the fact of such a skull as the one discovered within the round tower of Drumbo being proved to be cotemporaneous with the building in which it was found. Here, however, he must stop. So far from skulls similar in size and form being common in all ancient burial-places, it has rarely fallen to his lot to meet with one of similar character in any of the numerous examinations he has made in search of cranial remains; nor can he admit that the unusually sound condition of the bones is, by any means, to be considered as affording unquestionable evidence of the skull being so recent as Dr. Wilde would infer. The ability of bone to resist the disintegrating action of long continued exposure to moisture is largely influenced by its density, and by the amount of earthy constituents which enter into its composition. Now these differ materially, not only in the different bones of the body, but in the same bones at different periods of life; and are subject to be modified by disease, or by the preternatural conditions of the adjoining tissues. Thus the earthy components of the vertebræ do not exceed 53.7 parts in 100, whilst in the occipital bone they amount to 68.1; there being, at the same time, during life, a gradual diminution in the proportion of animal matter, and a corresponding increase in the proportion of the earthy components. Dr. Carpenter, however, whom we quote as our authority for these facts, [*Human Physiology*, p. 261,] does not consider this to be nearly so great as is usually supposed, and attributes the greater solidity of the bones of old persons chiefly to the circumstance, that their cavities are progressively contracted by the addition of new bony matter.

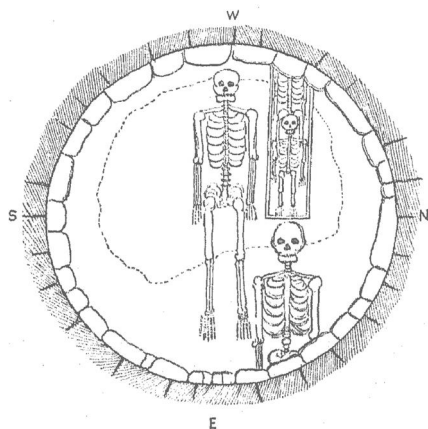
Be that as it may, the increased density of the bones in old persons is an admitted fact;—and the more perfectly their interstitial cavities become consolidated, by bony deposit or otherwise, the less permeable do they become to moisture, and the more tenaciously do they protect and retain the animal matter which is essential to their integrity. Furthermore, the bones of the cranium, in which we are more especially interested, are materially affected by the condition of the brain and its membranes, independent of the effects of age. In long continued cerebral disease, accompanied with increased vascularity, the bones of the cranium frequently become as dense and solid as ivory; to

such an extent, that Spurzheim was generally able to determine whether the head which he was engaged in opening came from the Bicêtre and the Salpêtrière, or some other hospital, by the force which it opposed to the saw or hammer! [*Gall*, vol. 3, p. 56.] An analogous condition has been observed in individuals of intensely energetic temperament; thus, the skull of Lord Byron is reported to have been "excessively hard, without the slightest sign of suture, like that of an octogenarian; and might almost have been said to consist of a single bone, without diploe." [*Phren. Jour.* vol. 1, p. 609.] Hence not only does the temperament of the individual, and the condition of the brain, largely determine the osseous character of the skull, but its physical characteristics reflexly become, in turn, no unimportant index to the original quality of the brain which it contained, as we have ventured to interpret them in this very instance. Indeed, to this cause alone can be attributed the unequal capability of resisting external influences exhibited by different skulls when placed under precisely similar circumstances. In the sepulchral mound at Mount Wilson, for example, which originally could not have contained less than forty skeletons, and which has furnished eight skulls to our collection, the greatest diversity of appearance was manifest among the crania, some being scarcely more decayed than that of Drumbo, whilst others were reduced to such a crumbling pulp as to render it impossible to remove them, even in moderate sized fragments; yet none of them had ever had any other covering than the soil in which they were imbedded: and they must have been so exposed for even a greater period of time than we feel disposed to assign to that of Drumbo, which, for many ages of its long entombment, had been protected by the sheltering walls of its lofty sepulchre. Indeed, in the collection of the Royal Irish Academy are two primeval skulls, of whose extreme antiquity no doubt whatever exists, and yet they are quite as perfect as that of Drumbo;—certainly they were inclosed in a chamber, not imbedded in the earth; but the continuous damp of thousands of years reduces even skulls thus protected to fragile ruins, unless its effects be counteracted by other influences, among which a more than ordinary density of the bone is one;—a phenomenon equally observable in these skulls also.\* Further, with the utmost deference for Dr. Wilde's admitted judgment and experience, we confess we cannot believe that the individuals who were present at the discovery of the skeleton, and personally cognisant of all the circumstances connected with the examination,—gentlemen, moreover, accustomed by scientific pursuits and cultivated habits of mind, to close and exact observation,—were not in a better position to observe, and more likely to arrive at correct conclusions on a simple matter of fact, than any one, no matter who, compelled, of necessity, to receive his information at second hand. But if any shadow of doubt could have remained as to the Round Towers and the deposits beneath their *lime floors* being cotemporaneous, the subsequent examination of the Round

\* In the notices in the *Athenæum* [Nos. 1320 and 1344] of the tombs excavated at Cumæ in 1853, only two skulls are mentioned; and, of these, one is described as

having been reduced to decayed fragments, the other as being uninjured, and exhibiting an unusual bony excrescence upon the forehead.

Tower of St. Canice, in Kilkenny, must have completely dispelled it; a condensed notice of which, from Graves & Prim's *History and Antiquities of St. Canice*, we here subjoin. The Tower, as therein stated, is 100 feet high, its circumference at base above plinth, 46 feet, 6 inches; diameter at base, 15 feet, 6 inches; at top story, 11 feet, 2 inches; battering off, consequently, 2 feet, 2 inches. In 1846, on removing the earth from the base, externally, a plinth 6 inches wide, and but 2 feet deep, formed the only foundation; and this plinth "rested, not on the grave, but *on a black and yielding mould*, from which protruded human bones in an East and West direction, a fact in the architectural history of the Tower, afterwards fully confirmed by a careful examination of its interior base." In July, 1847, the Dean of Ossory excavated the interior. The first stratum, 4 feet, 6 inches deep, consisted of the Guano of birds, and was so rich that it sold for £5; mixed with it were some human bones, and various bones of other animals.—"The human bones, amongst which was a skull of singularly idiotic conformation, occurred near the surface, and had evidently been thrown into the tower from time to time."—The next stratum was about 18 inches thick, its upper portion consisting of calcined clay, containing fragments of burned human and other bones; its lower, of rich loam, mixed with some calcined clay, small fragments of burned and unburned bones, and charcoal. Next came a stratum of rich black earth, 1 foot 7 inches thick, in which were fragments of bone, both human and belonging to the lower animals, the former predominating; spawls of dolomite, partially used in the construction of the tower; tusks of a large boar, and two pieces of copper; some of the bones and stones exhibiting the marks of fire. Underneath these lay—we now quote the words of the writers—"a wide layer of stones, resembling a pavement, extending over a considerable portion of the area of the tower; it ranged with the internal set-off, on a level with the external base course. About two feet in breadth of this pavement remained at the East side, and a strip of it extended all round the wall. The dotted



lines in the annexed diagram represent the boundary of the void or unpaved portion of the area of the tower. The pavement was covered by a coating of mortar, one inch in thickness. This pavement having been removed, the excavation was cautiously continued, and on the West side, close to the foundation, the skull of an adult male was exposed, and this skull was found to form a portion of a perfect human skeleton which had been buried in the usual Christian position, with the feet to the East; no trace of coffin or case, of wood or stone, presenting itself. Having cleared a trench about 3 feet wide, and 1 foot, 9 inches deep, across the centre of the area,

and collected all the bones of this skeleton, the writer proceeded to move carefully, with his own hands, the clay towards the North, when the crumbling remains of timber, apparently oak, presented themselves, and the ribs and vertebrae of a child were found. The upper portion of this skeleton, which lay parallel to the adult one just described, was covered by the western foundation of the tower, and over the ileum lay the skull of another child's skeleton, the extremities of which also extended towards the East; but the most extraordinary circumstance connected with these children's skeletons, and one that, were we not only an eye-witness, but also the actual excavators ourselves, would almost seem incredible, was the evident occurrence of a timber coffin, about an inch in thickness above, below, and, as far as followed, around the skeletons. The remains of the upper and lower planks were brought at some points nearly into contact, by the superincumbent pressure, but where the larger bones intervened, they were more widely separated. The traces of timber extended under the foundation of the tower, along with the upper portion of the first described child's skeleton, and that in such a way that it could not have been placed there after the tower was built. The timber, although quite pulpy from decay, exhibited the grain of oak: no nails were found." A second skull was found near the end of the child's coffin; the lower extremities, from the hips down, being concealed beneath the foundation of the tower. On sinking still deeper the bones of another adult skeleton presented themselves; but a regard for the safety of the tower precluded further examination, the earth having been already removed to a considerable distance below its foundation. The summit of the tower, when plumbed, was found to overhang its base by 2 inches; and as the wall was originally built to a batter of 26 inches, this would indicate a considerable subsidence at the point of least resistance, which was exactly over the lower extremities of one of the skeletons. [See diagram.]

It is thus abundantly manifest, from this and the previous investigations of Mr. Getty in other towers, that the builders of the Round Towers, by whatever motives influenced, were occasionally accustomed either to deposit within their walls, or to suffer to remain undisturbed beneath their foundations, the remains of their cotemporary fellow beings; and consequently we have every reasonable ground for believing that the skeleton discovered within the Round Tower of Drumbo, cannot certainly be less ancient than the tower itself.

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#### C L O N E S .

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From Mr. Getty's comprehensive notice of this place, it appears that there is historical evidence of its having been the site of an ecclesiastical establishment in the early part of the sixth century; as, according to the *Four Masters*, and the *Annals of Ulster*, quoted by him, A.D. 548, St. Tighearnach, who founded its monastery, died, or, as it is figuratively expressed, "rested" there in that

year. Of course, it must have been built some time prior to that date; and, in all probability, the Round Tower was of still earlier origin, since it exhibits the same architectural peculiarities observable at Drumbo—the spawled masonry, with large hammered stones, and the rectangular doorway, covered with a flat lintel, consisting of a single large stone. We cannot err much, therefore, in assigning as its date either the close of the fifth, or the very commencement of the sixth century; in which case the human remains found therein may be presumed to have been nearly cotemporary with the skeleton discovered at Drumbo. That they were as ancient as the tower itself is manifest from the several facts observed during their disinterment; and, as the writer was not only present at all the preliminary operations, but, as soon as the lime floor was reached, excavated with his own hands whatever bones were procured, he can with the greater confidence vouch for the accuracy with which the proceedings have been recorded. There is just one little discrepancy between Mr. Getty's notice and the notes made at the time by the present writer, as regards the lime floor, which did not, in itself, offer any difficulty to the operators. The writer's notes state:—"At this depth an internal offset, upon the same level as the first external one, was reached. The horizontal surface of this offset was covered with a thin coating of lime mortar, which extended completely across the tower, making another distinct and well-defined floor. This having been carefully uncovered by the throwing out of the floor which overlay it, an operation attended with considerable delay and difficulty, in consequence of the tenacity of the material, &c." So that the lime floor, in this instance, did not, in any respect, differ from those observed in the other towers, although the contrary might possibly be inferred from the difficulty stated by Mr. Getty to have been experienced in removing it, which he has evidently confounded with the difficulty actually encountered in removing the floor above it.

The entire number of skulls discovered was six, circumstanced as is fully described at pages 68 and 69 of this *Journal*, vol. iv. and occupying the positions there laid down upon the diagram. It was thus quite apparent that the body of one adult had been deposited entire shortly after death, but that all the other bones discovered had been removed from some prior place of interment, thrown in without any method or regularity, and covered up along with the body. The whole of the crania were in so frail and softened a condition that it was impossible to remove them except in almost hopeless fragments. The greater number of these were preserved, but, unfortunately, not all; no idea being entertained at the time that they could have been so satisfactorily put together as was subsequently done. By carefully saturating them with thin glue, cementing them together, and strengthening them with plaster of Paris, four of them have been tolerably well restored, and now admit of being measured with considerable accuracy. The group includes, so far as can be predicated from an inspection of the skulls alone, one female and three male crania. There is, besides, the posterior portion of the skull of a child, not exceeding 5 or 6 years of age, because, though the first permanent molars are considerably advanced, the permanent incisors still remain

entirely enclosed in the jaw. The sixth skull was so irreparably injured that no portion of it remains, except a fragment of the lower jaw. The measurements of the four more perfect skulls are given at large in Table No. 1, and need not therefore be repeated here.

Before proceeding further, however, it is only proper to observe that casts, and skulls restored in the manner described, cannot furnish, in some particulars, more than approximate measurements; and that it is of the first importance to derive our data, to the utmost possible extent, from perfect skulls alone. In such a case as the present, this, of course, is manifestly impossible; and yet such cases are precisely those in which it is most desirable to have correct measurements, in order that we may be enabled satisfactorily to compare the present with the past. Where the continuity of the cranial bones is tolerably well preserved, and the temporal bones remain, or even when one of them remains correctly attached to the adjoining bones, the outline of the skull can be determined with little difficulty, though there may be occasional defects or gaps in its surface; and, in this way, the external measurements of these four skulls are, with very trifling exceptions, quite reliable. Their cubic capacity, however, can only be considered as having been determined in a roughly approximate manner: as, in consequence of it having been found necessary for their preservation to consolidate their walls internally with plaster of Paris, the measuring of them upon Morton's plan, by filling them with shot, was clearly impossible. The method employed, therefore, for arriving at some probable estimate of their original capacity was this:—a square water-tight box, open at top, and having an overflow pipe about an inch below its surface, was filled with water until it flowed over through the pipe. When it had ceased to flow, and had arrived at a state of complete repose, skulls, whose sound condition admitted of their internal capacity being accurately ascertained by filling them with water and measuring it in Morton's cylinder by means of a float and graduated stem, were successively depressed in the water in the box, until it reached the superciliary ridge in front and the posterior margin of the Foramen Magnum behind; the ear openings, and any openings which would have permitted the water to penetrate the skull, being closed with a stiff paste made of linseed meal and water. The water thus displaced, when measured, gave the external volume of each skull, and the difference between that and its internal capacity the volume of its walls; which, on an average of four skulls, amounted to about one-fifth of the external volume. In this manner it has been attempted to form a probable conjecture as to the cubic capacity of five Round-Tower skulls and of four casts, which furnished no other means of determining it. The capacity of all the other skulls has been ascertained by actual admeasurement of their interiors with shot, as recommended by Morton. This method of determining external volume is a slight modification of one devised by the late Mr. Stratton, of Aberdeen. [*Contributions to the Mathematics of Phrenology*, page 5.]

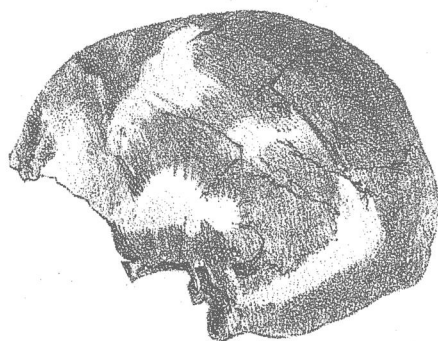
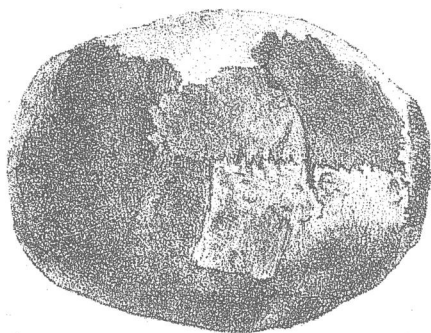
If we now turn to Table No. 1, we cannot fail to be struck with the very marked contrast existing, in several particulars, between the skulls from Clones and the skull from Drumbo. In

absolute size, one of them appears to be fully as large as the latter, the other three considerably smaller. In absolute length, there is very little difference. One is precisely the same; two a mere shade (the  $\frac{1}{100}$ th of their length) shorter; and the other as much larger. In breadth, however, their difference is very great, the highest being  $\frac{2}{10}$ ths of an inch, the lowest  $\frac{1}{10}$ ths, and the average of the four  $\frac{6}{10}$ ths, under that of Drumbo. In the proportional measurements of their profile sections, some well-marked distinctions are also observable. Nos. 1, 2, and 4, at 90 degrees, are either identical in height with the Drumbo skull, or the merest shade above or below it; but with this difference, that whereas the Drumbo skull attains its full elevation at 40 degrees, and retains it till it passes 90 degrees, in the others there is a more or less progressive ascent from zero to 90 degrees, the radii anterior thereto being generally somewhat shorter, and those posterior to it somewhat longer than the same radii in the Drumbo skull. For example:—

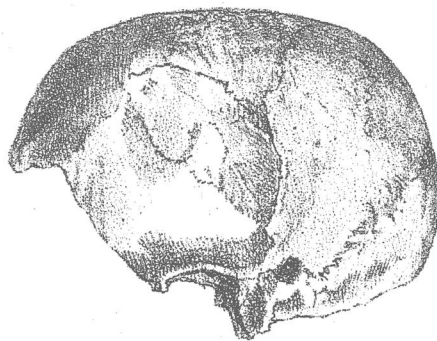
LENGTH OF RADII AT ANGULAR INTERVALS OF TEN DEGREES.

| Degrees .. .. .       | 0   | 10  | 20  | 30  | 40  | 50  | 60  | 70  | 80  | 90  | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Drumbo .. .. .        | .51 | .53 | .59 | .63 | .65 | .65 | .65 | .65 | .65 | .65 | .64 | .61 | .58 | .56 | .53 | .49 | .44 | .38 | .25 |
| Clones, No. 4 .. .. . | .48 | .52 | .55 | .59 | .60 | .61 | .61 | .62 | .64 | .66 | .66 | .63 | .61 | .59 | .57 | .53 | .48 | .34 | .27 |
| „ „ 3 .. .. .         | .48 | .54 | .54 | .60 | .60 | .60 | .60 | .60 | .60 | .60 | .60 | .60 | .58 | .56 | .54 | .52 | .47 | .34 | .26 |

But this, it will be perceived, does not hold good with regard to the fourth Clones skull (No. 3), which is singularly low, being only .60 at 90 degrees, an elevation which it attains at 30 degrees, and retains uninterruptedly until it reaches 110 degrees; thus differing largely, in this particular feature, not only from the Drumbo skull, but also from its own congeners. It is in their transverse diameters, however, that the greatest difference is perceptible; for, whereas in the Drumbo skull the whole temporal zone is excessively bulging and protuberant, giving to the entire head, as already remarked, a strikingly globular character, the same region in the Clones skulls projects but little beyond the juxta-temporal, imparting to the sides of the head a somewhat flattened contour:—the transverse coronal arches, except in No. 3, where they are particularly low and flat, rising abruptly with an irregular keel-shaped outline—features recognisable at a glance in the accompanying plates. Judging from what remains of their several lower jaws, No. 1 would appear to have been a man of middle age; No. 2, a young man of 18 or 20; No. 3, a female from 25 to 30; No. 4, from the very worn condition of the teeth—which, curiously enough, are only 14 in number, and exhibit no traces of wisdom-teeth, either in progress of being developed or as having been removed—a man somewhat beyond the prime of life; No. 6, whose skull was unfortunately destroyed, still more aged; and finally, as already observed, No. 5, a child of five or six: consti-



CLONES  
Nº2.



ARMOY.

tuting, in all probability, a family group, several members of which, for some, as yet unexplained reason, had been removed from their previous place of sepulture, to be deposited along with a recently deceased relative in this, their newer sepulchre.

### A R M O Y .

Next in order of the Round-Tower crania is the one discovered at Armoy, near Ballycastle, in the northern extremity of the county of Antrim [*Journal*, page 175, vol. iv]. It is worthy of remark that, in this case, no bones of the skeleton, except the three first cervical vertebrae, had been interred along with the skull, and these were found occupying their proper relative positions; proving indubitably that it must have been deposited there *as a head*, with its integuments attached, the decapitated trunk having been otherwise disposed of.

The references on this subject [vol. iii., p. 360, and vol. iv. p. 175] show that it was no unusual practice for the early Irish (a practice by no means confined to them, but common alike to all rude nations) to decapitate their slaughtered enemies from a spirit of revenge, and, when unsuccessful, their own fallen chieftains, to prevent their bodies being subjected to a like indignity at the hands of their opponents; hence, it is more than probable that this Armoy skull represents some person of repute and station, who had fallen in battle, and whose head, rescued from outrage by friendly hands, was deposited within the tower, just then in course of erection.

It is a skull of moderate size, having a cubic capacity of 82 inches or thereabouts, being 7 inches below the Celtic average. Its length and breadth are very nearly the Celtic average, being 7.25 x 5.5, equal to 1.0 x .77 of the proportional scale. Its profile section is superior to that of Clones, No. 4, attaining its full elevation at 80 degrees, and maintaining it to 90 degrees. Though *absolutely* lower than the Drumbo skull at 90 degrees by 0.15 inch, it *absolutely* exceeds it at 10 degrees and 20 degrees by the same amount, and from 110 to 150 degrees falls short by amounts varying from 0.2 to 0.4 inches. Their proportional measurements are as follow:—

LENGTH OF RADI AT ANGULAR INTERVALS OF TEN DEGREES.

| Degrees .. .. . | 0   | 10  | 20  | 30  | 40  | 50  | 60  | 70  | 80  | 90  | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Drumbo .. .. .  | .51 | .53 | .59 | .63 | .65 | .65 | .65 | .65 | .65 | .65 | .64 | .61 | .58 | .56 | .53 | .49 | .44 | .33 | .25 |
| Armoy .. .. .   | .54 | .60 | .64 | .66 | .66 | .66 | .66 | .66 | .66 | .66 | .65 | .61 | .58 | .55 | .50 | .45 | .34 | .22 | .19 |

Thus, though 12 or 14 inches inferior in cubic capacity to the Drumbo skull, its proportional profile measurements anterior to 90 degrees exceed it throughout, but especially from 0 to 30 degrees, giving to it a less perpendicular, but much more prominent forehead; from 40 to 100 degrees they

preserve the same relative difference; are exactly the same at 110 and 120 degrees; thence to 180 degrees they diverge again, the difference at 160 degrees amounting to .10, indicating a much less prominent occiput. It is in their transverse diameters, however, that the greatest contrast is exhibited, their temporal zones exhibiting an immense dissimilarity, not observable at all in the juxta-temporal. Thus, their respective proportional diameters are :—

| DIAMETER OF    |         |  | TEMPORAL ZONE. |     |     |     |     |     | JUXTA-TEMPORAL ZONE. |     |     |     |     |     |
|----------------|---------|--|----------------|-----|-----|-----|-----|-----|----------------------|-----|-----|-----|-----|-----|
| At             | Degrees |  | 10             | 30  | 60  | 90  | 120 | 150 | 10                   | 30  | 60  | 90  | 120 | 150 |
| Drumbo .. .. . |         |  | .65            | .72 | .80 | .88 | .90 | .72 | .50                  | .62 | .72 | .78 | .68 | .52 |
| Armoy .. .. .  |         |  | ?              | .70 | .74 | .76 | .72 | .69 | ?                    | .68 | .70 | .72 | .61 | .51 |

The perpendicular parietal, and the rapidly narrowing occipital bones of the latter, contrasting remarkably with their full and spherical contour in the former. The bones of the cranium are in too decomposed a condition to furnish any information as to the probable age of the individual; but the appearance of the teeth still remaining, would seem to indicate that he could not have been young. To what particular era the building of the tower is to be referred, is also a matter of some doubt. Upon the authority of Dr. Reeves, it appears that the church was founded A.D. 474, and we might naturally conclude the tower to have had as early an origin; but the semi-circular head of its door-way, cut out of a single stone, while it places it within Dr. Petrie's definition of the oldest towers, seems, nevertheless, to associate it closely, in architectural peculiarities, with the towers of Kilmaeduagh and Glendalough, of whose door-ways he gives drawings at page 401 of his work, and which he pronounces to be "undoubtedly" erections of the early part of the seventh century. It may, without any risk of error, therefore, be considered as not being of later date than the commencement of the seventh century—a date which, at the lowest calculation, gives to the tower and its contents an antiquity exceeding 1200 years.

#### DRUMLANE.

The last tolerably perfect cranium obtained by Mr. Getty from the interior of any of the Ulster Round Towers, was that discovered at Drumlane, in the county Cavan [see page 110, vol. v]. Unfortunately, the interior of the tower had been previously disturbed in search of treasure; and, though what remains of the skull procured there, is remarkably sound and dense, being manifestly

that of a very old person,<sup>s</sup> both the temporal bones are wanting; rendering it impossible, in consequence, to determine accurately its true height and breadth. Its absolute length is very great, being 8.2 inches, or  $\frac{7}{10}$ ths longer than the Drumbo skull;  $\frac{9}{10}$ ths above the Celtic average;  $\frac{2}{10}$ ths above the one extreme of the Celtic range; and 1 inch  $\frac{6}{10}$ ths above the other. Its breadth above the temporal region is only 5.5 inches, but it is more than probable that, upon the temporal bone itself, it would have somewhat exceeded that diameter; so that its proportional measurements 1.0 x .675 must, to some extent, undervalue its original breadth. In other respects, its general features so closely ally it with the Celtic group, that its extreme length is most probably to be attributed to a mere exceptional deviation from the typical standard, such as is occasionally to be met with in every department of organic nature; instead of indicating, as might hastily be inferred, any true typical modification.

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#### DEVENISH AND DOWNPATRICK.

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Besides the skulls obtained from the interior of several of the Round Towers of Ulster, of which we have just treated, two others were procured in ecclesiastical structures of a different character, but of similar antiquity;—one within the stone-roofed chapel at Devenish, the other within the ancient portion of the present cathedral of Downpatrick. The circumstances connected with the examination of the ruins on the Island of Devenish have already been detailed by Mr. Getty [vol. iv., page 179]. Those relating to the discovery of the skeleton at Downpatrick may be briefly narrated here. The fruitless search after the remains of a Round Tower at Downpatrick in Sept., 1842 [vol. iv., page 129], had the good effect of drawing public attention to such inquiries; and, in consequence, in February, 1845, the Right Rev. Dr. Denvir, R.C. Bishop of Down and Connor, (to whom the writer is indebted for much valuable assistance on several other occasions also,) informed him that a very ancient grave had just been discovered in the cathedral of Downpatrick. On proceeding to the spot, it was ascertained that, in lowering the floor to re-flag it, and to allow of a large bed of broken stones being placed under the flags as a safeguard against damp, a considerable quantity of material had to be carted away. When the excavation had been carried to a few inches below the level of the foundation of the walls, the pick-axe struck upon some hard substance, which, upon examination, proved to be the covering of a grave, containing a human skeleton, much of it in good preservation. The grave was about 6 feet long and 12 inches deep, and had been excavated entirely out of the original or undisturbed soil, upon which the foundation of the

<sup>s</sup> This is inferred from the great thickness of portions of the frontal bone, which in some places measured six-tenths of an inch, and in others not more than three—the consequence of a gradual deposition of bony matter

internally, to supply the place of the shrinking and receding of the brain, which takes place in extreme old age.—See *Gall*, vol. iii., page 30.

cathedral rested; its sides and ends being lined with coarse flag-stones, from 2 to 3 inches thick, placed on edge. It lay due east and west in the southern aisle, at about 5 feet from the western pillar; and within it were two blocks of chiselled red sandstone, one at either end, upon the western one of which the skull rested. The whole had been covered over with flat stones, similar to those with which the grave was lined, their upper surface being about 8 or 9 inches below the level of the foundation of the building, which, at this point, did not appear to be more than a foot beneath the surface of the present floor.<sup>h</sup> The abbey, founded by St. Patrick, who was buried there in 493, is considered to have been the first cathedral of the see of Down. It appears to have been a most unfortunate structure, having been six times plundered by the Danes between the years 940 and 1111. It was rebuilt by Malachy O'Morgair, primate of Ireland, in 1135; in 1315 it was burned by Edward Bruce; it was again repaired in 1412; and, in 1538, burnt once more by Lord Leonard de Grey: in 1663, it was in so ruinous a condition that Charles II., in that year, erected the church of Lisburn into a cathedral and bishop's see, for the diocese of Down and Connor. From that date until 1790, it remained in ruins, its interior having been used as a place of interment for many generations. In the year last named, its restoration was recommenced. It was opened for divine worship in 1817, and its tower was completed in 1829. During the progress of its restoration, not only were the materials accumulated within it in the course of ages, from human interments and other causes, completely carried away, but, externally, a portion of the old burial ground was also removed; the hill, in order to construct a more convenient approach, having been cut down considerably below the level of the original graves, as was quite apparent from a section observable at one place, in which a stratum of undisturbed earth, 3 feet deep, underlay another stratum of equal depth, composed altogether of dark mould and human bones, covered at top with a rich coating of green sward. Now, as it is very unlikely that, in making so sweeping a change, anything above the original floor would have been allowed to remain, and as no trace of any interment upon that level was met with, either in the northern aisle or the remainder of the southern one, there can be no doubt that the grave must date back as far as the original erection of the building, which, as it was of sufficient importance to tempt the cupidity of the Danes in 940, must have been, at least, some considerable time anterior to that date: but how long, for want of further evidence, can only be matter of conjecture; since, if even any vestige of the original structure should chance to remain, the many vicissitudes to which it was subjected, can have left no portion of it in a condition sufficiently perfect for determining its architectural era. All that can safely be pronounced, therefore, respecting the skull thus discovered within its walls, is that it must certainly be above 900 years old, and may possibly be two or three hundred years

<sup>h</sup> At the time of our visit, the stones which lined the grave had been removed, and the grave itself filled up; but the Rev. Dr. Macauley, P.P., had obligingly pre-

served the skull, and caused the grave to be cleared out for our inspection. The particulars detailed were furnished by the contractor for the work.

more. The skull from "St. Molaisi's house," Devenish, judging from the facts adduced by Mr. Getty, must be older still; both, therefore, though probably inferior in age to some of those procured within the Round Towers, are not deficient in interest, dating, as they do, from a period long prior to the English invasion, and even to the first predatory incursion of the Danes, of which we have historical evidence.

The Devenish skull is scarcely of average dimensions, its cubic capacity being only 86 inches, its length 7, and its breadth 5.85 inches. Its proportional length and breadth are 1.0 by .835. It has not suffered any injury from its long interment, and the condition of the bones would indicate it to have belonged to an individual possessed of a remarkably active brain, of a character more refined than vigorous. They are thin, dense, of very close texture, and in places translucent. The sutures, including even the frontal one, which is usually obliterated in early life, are perfect, delicate, free from coarseness, and exhibit no vestiges of triquetral bones. It is clearly *non-Celtic*; its measurements allying it closely with the Drumbo skull, exhibiting the same protuberant temporal zone, but counterpoised, however, by a far superior frontal development. The teeth are much worn down; but the condition of the skull, in other respects, does not warrant the inference that it belonged to a person who had lived to an extreme old age, but rather to an individual past the prime of life, whose brain and mental energies had preserved their activity unimpaired. When first discovered, there was attached to the occipital bone, somewhat behind, and to the side of the left condyle, a bony projection  $\frac{7}{16}$ ths of an inch long, having an irregular oval base  $\frac{5}{16}$ ths by  $\frac{4}{16}$ ths of an inch, and terminating in a well-marked, but narrow, articulating surface, which would appear to have largely usurped the office of the adjoining condyle—as the latter was much less developed longitudinally, but more prominent than the one upon the opposite side, whilst its surface, with the exception of a very small portion posteriorly, exhibited an uneven irregular appearance, incompatible with the perfect action of the part. Unfortunately, this abnormal process has had its extremity accidentally broken off, and, none of the vertebrae having been obtained, the exact nature of the articulation cannot now be determined; but that it must have occasioned, during life, some lateral displacement of the head, can scarcely admit of doubt.

The Downpatrick skull is evidently similar in type to those from Drumbo and Devenish, as a comparison of their proportional measurements will prove; but it is very small, its capacity being only 77 cubic inches, its length 6.7 inches, and its breadth 5.6 inches. Its proportional length and breadth are 1.0 by .835. The bones are of moderate thickness, and in good preservation; but, though enclosed in a chamber, have been more acted upon than was the case with either of the others which were buried in the earth, possibly in consequence of original inferiority of temperament. The teeth are sound, considerably worn down upon the right side, much less upon the left—the sutures well-defined and perfect; the whole leading to the con-

clusion that the age of the individual could scarcely have exceeded 35 or 40. The temporal regions are very prominent, the frontal one rather narrow, the occipital large and unsymmetrical; the whole head, irrespective of absolute size, being inferior in the disposition of its parts to the Drumbo and Devenish skulls. The measurements of these three, and of Donatus, first Danish archbishop of Dublin, are given in parallel columns in the first table, but, for facility of comparison, the chief proportional measurements are repeated here:—

| Degrees     | .. | .. | .. | .. | 0   | 10  | 20  | 30  | 40  | 50  | 60  | 70  | 80  | 90  | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |
|-------------|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Donatus     | .. | .. | .. | .. | .48 | .55 | .56 | .61 | .62 | .62 | .62 | .62 | .62 | .62 | .61 | .59 | .58 | .57 | .54 | .50 | .44 | .35 | .22 |
| Drumbo      | .. | .. | .. | .. | .51 | .56 | .59 | .63 | .65 | .65 | .65 | .65 | .65 | .65 | .64 | .61 | .58 | .56 | .53 | .49 | .44 | .33 | .25 |
| Devenish    | .. | .. | .. | .. | .51 | .56 | .61 | .65 | .65 | .65 | .65 | .64 | .65 | .65 | .64 | .63 | .58 | .56 | .52 | .49 | .44 | .32 | .24 |
| Downpatrick | .. | .. | .. | .. | .51 | .56 | .60 | .64 | .65 | .66 | .66 | .66 | .66 | .66 | .64 | .61 | .59 | .56 | .53 | .49 | .40 | .34 | .28 |

## TRANSVERSE DIAMETERS.

|             |         | TEMPORAL ZONE. |     |     |     |     |     | JUXTA-TEMPORAL ZONE. |     |     |     |     |     |
|-------------|---------|----------------|-----|-----|-----|-----|-----|----------------------|-----|-----|-----|-----|-----|
| At          | Degrees | 10             | 30  | 60  | 90  | 120 | 150 | 10                   | 30  | 60  | 90  | 120 | 150 |
| Donatus     | ..      | .63            | .72 | .84 | .84 | .79 | .72 | .53                  | .64 | .72 | .78 | .71 | .58 |
| Drumbo      | ..      | .65            | .72 | .80 | .83 | .80 | .72 | .50                  | .62 | .72 | .73 | .68 | .52 |
| Devenish    | ..      | .64            | .70 | .80 | .83 | .75 | .68 | .64                  | .67 | .72 | .76 | .66 | .55 |
| Downpatrick | ..      | .65            | .72 | .80 | .83 | .79 | .71 | .54                  | .62 | .71 | .77 | .69 | .57 |

The general coincidence here is quite remarkable. The skull of Donatus is, indeed, inferior to the other three in vertical elevation, but it preserves the same relative proportions from 40 to 90 degrees, and has this inferiority counterpoised by its superior diameter; the head exhibiting the appearance of being somewhat abnormally flattened upon the vertex and protuberant at the base—the transverse diameter of the Foramen Magnum actually exceeding its antero-posterior diameter. At 30 degrees the vertical elevation of the Devenish skull exceeds all the others. Upon the same radius its temporal diameter is less, and its juxta-temporal considerably more, indicating a smaller basal and a more voluminous anterior and superior development of the frontal region; this preponderance being further enhanced by a corresponding diminution in the dimensions of the skull posterior to 120 degrees. Other differences, coincident with individual peculiarities, may be observed in them all; but the general correspondence is so very great as to render it more than probable that they belong to one common type.

With the skull from Downpatrick concludes the series of crania actually found within the Round Towers of Ulster by Mr. Getty, and of those apparently associated with them in date and locality. Before proceeding, therefore, to comment upon their ethnological bearing, it may be as well, perhaps, to examine, in this place, how far the monumental hypothesis, which originated the inquiry, is affected by the results.

That the towers could never have been erected exclusively for sepulchral purposes, is proved beyond dispute by the Round Tower of Devenish, one of the most perfect and beautiful of them all, in which no human remains were found, or had ever been deposited. On the other hand, that several of them were *designedly* so employed, is quite as well an established fact, not only from the numerous skeletons discovered within them, but from the circumstance also of a sepulchral cist having been specially constructed for the skeleton found beneath the tower of Trummery. How, then, are these admitted anomalies to be reconciled? It is matter of history that a vast number of our early ecclesiastical buildings were erected at the cost of private individuals, actuated either by pious zeal or a desire to compound with heaven for the perpetration of some offence against religion; and, as Mr. Getty has already well remarked, these structures, though not erected for sepulchral purposes, were, and to this day still are, in some cases, used as places of sepulture. It is far from unlikely, therefore, that chieftains or petty kings, influenced by similar feelings, may have erected, or contributed towards the erection of, the towers, essential for the security of the church property; and, at the same time, have taken advantage of the opportunity to have interred within their sacred precincts the honoured remains of their departed kindred. Such a view of the matter is strongly confirmed by the annexed quotation from the Registry of Clonmacnoise, a document of the fourteenth century, quoted by Dr. Petrie [page 388]:—

“ And the same O’Ruairk, of his devotion towards y<sup>e</sup> church, undertook to repair those churches, and keep them in reparation during his life upon his own chardges, and to make a causey or Tocher, from y<sup>e</sup> place called Cruan na Feadh to Iubhar Conaire, and from Iubhar to the Loch; and the said Fergal did perform it, together with all other promises that he made to Cluain, and the repaying of that number of chapels or cells, and the making of that causey, or Togher, and hath for a monument built a small steep castle or steeple, commonly called in Irish ‘Claiethough,’ in Cluain, as a memorial of his own part of that Cemetarye; and the said Fergal hath made all those cells before specified in mortmain for him and his heirs to Cluain; and thus was the sepulture of the O’Ruairk’s bought.”

It is to be observed, however, that Dr. Petrie expresses some doubt as to the authenticity of the document [page 265], though he acknowledges that Archbishop Ussher states it to have been in existence in his time, and that an autograph translation of it by the celebrated Irish antiquary,

Duald Mac Firbis, is preserved among Ware's manuscripts in the British Museum. Upon some such supposition only as that now suggested can we reasonably account for the interment of a recent body with the fleshless skeletons of a whole family, as observed at Clones; or explain the almost incredible anomaly of such a ponderous structure as the tower of St. Canice having been erected upon so insecure and compressible a foundation as decaying bodies and an oaken coffin. Assuredly, the architect who planned that building would never have imperilled its stability, as he did, or have compromised his own reputation, out of respect for *common bones*: much more likely is it that he thus acted contrary to his own judgment, in obedience to the wishes of some person of more than ordinary weight and influence, unwilling to have the bodies of his children and relatives disturbed, and yet desirous of having the tower erected within his portion of the cemetery. Whilst the investigation, therefore, has brought nothing to light in the smallest degree subversive of Dr. Petrie's conclusions as to the "origin and uses of the Round Towers of Ireland," it has proved most clearly that both he and the members of the South Munster Antiquarian Society have been in error—the one in dogmatically pronouncing the towers to be nothing but sepulchral structures, the other in denying, quite as dogmatically, that they had ever been employed by their original founders for sepulchral purposes.

Having already encroached upon the limits of this *Journal* to an extent not originally contemplated, a summary analysis of the remaining ethnological materials at our command is all that can be further attempted; the full details, however important, would be too voluminous, and must be reserved for some more appropriate channel of communication.

The number of skulls derived from Irish sources to which we have had access, and of which either the originals or casts of them are in our possession, amounts to 54. We had, besides, permission from the Very Rev. Dr. Spratt to take ample measurements and tracings of the skull of Donatus, already referred to in this *Journal* [vol. 1, page 203]; and through the kindness of the Rev. C. Buckley, P.P. of Battevant, we were not only enabled to add to our collection the seven skulls obtained from that locality, but had also the opportunity of measuring the length and breadth of 50 others; the number, indeed, being only limited by the time at our disposal, as, at a rough estimate, the mass of human remains collected in the vault of the old abbey could scarcely have measured less than 16 feet by 10, and must have been four or five feet high. In order to base our observations upon as broad and general a foundation as possible, the modern crania, as will be perceived, have been procured from very widely separated portions of the kingdom; and, as it happens, even the more ancient prove, in several instances, to be from districts sufficiently remote from each other to render it highly improbable that they represent mere local varieties. The whole collection, as a cursory survey will render apparent, resolves itself naturally into chronological groups, and may with propriety be classified as follows:—

## CHRONOLOGICAL CLASSIFICATION OF SKULLS, AND CASTS OF SKULLS, FROM VARIOUS IRISH SOURCES.

Number of

7 *Primeval or Pre-Historic, viz.:*—

- 2 from large tumulus, Phoenix Park, Dublin.
- 1 „ small do. do.
- 1 „ sepulchral chamber, county Tyrone.
- 2 „ Ballynehatty, Giant's Ring, county Down.
- 1 „ railway cutting (?)

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7.—Of which five permit of their cubic capacity being actually or approximatively determined, and the whole admit of the other principal measurements being accurately taken.

22 *Remote, but not Primeval, viz.:*—

- 8 from sepulchral mound, Mount Wilson, King's County.
- 9 „ Round Towers in Ulster, and other ecclesiastical buildings.
- 1 „ Christ Church Cathedral, Dublin (Donatus).
- 1 „ the ancient foundation of the old Castle of Belfast.
- 3 „ the bed of the Blackwater, Blackwatertown, county Armagh.

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22.—Of which 19 permit of their capacity being actually or approximatively determined, and 21 admit of the other principal measurements being accurately taken. Of this group, 18 appear to be *Celtic*, 3 to be *non-Celtic*, and 1 is *Danish*.

25 *Modern or Comparatively Modern, viz.:*—

- 1 Cast of reputed skull of Carolan, the Irish bard.
- 1 Skull from Old Poor-house burial ground, Belfast.
- 1 „ burial-ground, county Wicklow.
- 5 „ Cathedral burial-ground, Armagh.
- 3 „ Inniskeen church-yard, county Monaghan.
- 7 „ ossuary at Buttevant, county Cork.
- 4 „ Aghadoe church-yard, near Killarney, county Kerry.
- 2 „ Western Isles of Arran, county Galway.
- 1 „ Rock of Cashel, county Tipperary.

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54 25.—The whole of this group is *Celtic*, and, with one or two exceptions, permits of all the measurements being accurately determined.

50 *Modern Celtic*, examined at Buttevant, but only the length and breadth of which were determined by actual measurement.

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Total, 104

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Most of the measurements of the foregoing, so far as they have been completed, are given in No. 1 of the annexed Tables, and in the Table of Measurements, previously given at page 88 of the present volume. Of these Tables, it will now be desirable to offer some explanation. No. 1 is simply a tabular arrangement of the several measurements of each skull, in the order in which they are taken. It constitutes the basis of the other Tables, and, when the measurement of the whole collection shall have been completed, it is intended to arrange them in groups of ten each, by means of which each group will be complete in itself, and will admit of ready comparison with the other groups, or with any group of similar extent which may be subsequently added; thereby materially facilitating the operation of deducing general results from the data which they will supply. No. 2 is a numerical analysis of the several chronological groups, giving the highest, lowest, and average dimensions, under their respective heads, of the various measurements of volume, not only of the whole group, but also of the local sub-sections of each group. The first, or primeval group, is, unfortunately, very small at present, but, it is hoped, may form a centre round which, in course of time, fresh additions may accumulate. Limited as it is, however, it affords some very instructive information. It clearly contains two well-defined typical varieties, of which the skull from Donaghmore represents one, and the remainder of the group the other. At the meeting of the British Association in Belfast in 1852, Mr. Bell, of Dungannon, exhibited a skull, of which he permitted the writer to take a cast. The circumstances connected with its discovery will best be given in the following communication, with which he has obligingly favoured us:—

“DUNGANNON, 1st June, 1858.

“DEAR SIR,—The skeleton of which you had the skull from me, during the meeting of the British Association at Belfast in 1852, was discovered in a cist-vault on the side of a fort or mount, called Shane-maghery, near Donaghmore, in this county (Tyrone). The cist was laid open by some labourers, in removing gravel in order to repair a road. In the small rectangular chamber, formed of rude stones, and covered at top by one of larger dimensions, the skeleton was placed in a sitting posture, with the head leaning to one side. The thing which had moved with life in a remote age, seemed now thoughtfully contemplating the few of the present race which curiosity had summoned to gaze on its structure. A body of police with an officer, the coroner of this county, and several other medical gentlemen, were about to hold an inquest on the remains; but they relinquished their purpose on learning that the person whose bones were before them, might have died fifteen hundred or two thousand years ago! The skeleton did not seem to have undergone calcination. The ornamented urn which lay alongside of it, contained a small portion of what seemed to be turf mould. No implement of stone, bone, or metal, was found in the square chamber, nor were any traces of spiral curves or zigzags, resembling tattooing, discernible on the interior surfaces of the cist slabs. No fragments of charred wood were found with the skeleton.

“John Grattan, Esq., Belfast.”

I am, dear sir, yours respectfully,

JOHN BELL.

The skull thus brought to light, though, from its compact form, it may appear small to the eye, exceeds the Celtic average by four cubic inches. Its length is  $\frac{2}{10}$ ths of an inch below the Celtic average, and its breadth the same amount above it: its proportional breadth .83, placing it nearly on a par with the crania of our 2nd group. There is this distinction between them, however—that

instead of its temporal region being protuberant like theirs, its parietal walls are flattened and perpendicular; whilst its vertical elevation is very considerable, being .71 at 90 degrees, the average being only about .66—this superiority, moreover, being maintained throughout from 20 to 120 degrees. At a meeting of the British Association in Birmingham, Professor Retzius read a valuable paper upon some skulls and casts of skulls which had been sent to him from the British Islands, with the object of showing that several of them were of a type quite different from the Celtic; and he gives, as one of his illustrations, the skull from the small tumulus in the Phoenix Park in Dublin, which, in almost every particular, agrees with that from Donaghmore. In Dr. Wilde's work, already referred to, there is also (page 232) an excellent drawing, on a reduced scale, of a similar skull, discovered in a small stone chamber on the south side of the Rock of Dunamase, in the Queen's County. The specimens, therefore, are too numerous, and have extended over too wide an area, to permit of their being considered as mere varieties—especially as a similar form of skull is to be met with amongst the aboriginal remains found in England, and over a large portion of the Continent of Europe. Retzius is disposed to consider them of "Turanic" origin, to have preceded the Celtic population, and to have their living representatives in the Fins or Laplanders. The remainder of the group exhibits the long narrow form of skull with flattened sides, the proportional breadth varying from .80 to .74, the average being .77; and it is particularly worthy of observation, that the two *extremes* are to be found in the *two* specimens discovered within the large tumulus in the Phoenix Park, Dublin:—proving, beyond all dispute, that the commonly received notion of cranial forms becoming more and more stereotyped the further back we penetrate into the obscurity of the past, is not countenanced by exact and accurate observation; variety, within prescribed limits, appearing to be the law and not the exception, as might have been anticipated by any one accustomed to watch, with an observant eye, the countless varieties of mental combination exhibited by every race, and to recognise, in the human brain, the material instrument of the human mind. A description of the tumulus in which these skulls were discovered will be found in the *Proceedings of the Royal Irish Academy* [vol. i, page 186]. There was found with them a fibula of bone, a flint knife or arrow-head, and the remains of a necklace of shells, of which a restored sketch is given in Wilde's *Catalogue* of the antiquities in the museum of the Royal Irish Academy, page 183. All their concomitants, therefore, prove them to be the relics of a people upon whom the first dawn of civilisation had not as yet broken; and their occupancy of a common tomb would imply that they were not only cotemporaneous, but of kindred blood. Whether we consider, therefore, their close relationship to each other, as regards race or consanguinity, their extreme remoteness from us in point of time, and their consequent protection from the various modifying influences exercised by long-continued civilising agencies and international communication, no more favourable specimens could have been selected for testing the assumption already referred to, or the doctrine, which we hope to establish in another Table, that conformity of type admits, as in other departments of

nature, of considerable divergence from the typical standard. From the numerical superiority of the "long-headed race" in the primeval specimens hitherto brought to light, and from the universal predominance of the same form amongst our existing population, we are disposed to accept as correct the opinion of Retzius, that the Turanic form of head preceded the Celtic, though both must have occupied these islands at a period antecedent to its earliest civilization.

The 2nd, or *Non-Celtic* group, has already been largely noticed when treating of its three first members in their regular order. In the absence of any authentic standard of the Scandinavian head with which to compare them, our inferences can be nothing more than conjectural. There is, however, in some important particulars, so close a resemblance between them and the skulls of Donatus, an undoubted Dane of the 10th century; of Spurzheim, a modern of Teutonic origin; and of King Robert Bruce of Scotland, whose pedigree included two Danish, nine Norwegian, and two Norman ancestors in twenty generations [*Proceedings of the Society of Antiquaries of Scotland*, vol. i., page 240], that it appears by no means improbable that some intermixture of Teutonic or Scandinavian blood may have obtained a friendly footing in the North of Ireland prior to the fifth century. Certainly, the skulls referred to are not Celtic, and the localities in which they were interred preclude the idea of their being of hostile introduction.

The 3rd group includes the remainder of the skulls already described, and, with the exception of the *sub-group* from Mount Wilson, will not require any comment. In it are several well-marked modifications of head; all, with the exception of No. 3, exhibiting the peculiarities of extreme proportional length, with a tendency to vertical, instead of lateral development. No. 3, however, so closely approaches in form to the type of head of which the skull from Donaghmore is an example, as to lead to the conclusion that, at the date of the Mount Wilson interments, which must have been very many centuries subsequent to the interment of the skeleton at Donaghmore, the race to which the latter belonged, had not become extinct altogether, but continued to linger amongst, and perhaps contributed to modify, the more numerous population which surrounded it. In No. 2, on the other hand, of which three reduced drawings are given in Plate 1, we have an illustration of the extent to which the vertical dimensions of the cranium may be developed. It is truly a noble skull, and noble must have been the aspirations of the mind of which it was once the tabernacle. Even though the intellect should fail to appreciate their moral and intellectual import, the eye instinctively recognises the beauty and symmetry of its proportions, the impressive dignity of its lofty profile, and the graceful curvature of its transverse coronal arches. Though its cubic capacity exceeds Spurzheim's by 5 inches, and the Celtic average by upwards of 15 inches, its length is  $\frac{3}{8}$ ths, and its breadth  $\frac{1}{8}$ ths of an inch less than Spurzheim's. Compared with the Celtic average, its length is precisely the same (7.25 inches), and its breadth a little above it. Its proportional length and breadth being  $1.0 \times .77$ —the Celtic average  $1.0 \times .75$ ; the entire preponderance in volume, therefore, depends upon its greater coronal elevation, which at 90 degrees is .73,

the average being under .67. The texture of the bone, too, is quite in keeping with the other features of the skull, being exceedingly thin, fine, and delicately regular upon its surface,—circumstances which would almost induce the belief that it has been the representative of some family where originally high endowments had been hereditarily improved by moral and intellectual culture; in which case, it would require no great stretch of imagination to conceive that its owner may, in his day, have been some Brehon of distinguished reputation, and have discharged, with honour to himself, and benefit to his race, the duty of interpreting and administering those very Laws which are now in course of publication. Indeed, even in this small group, the tenants of one common tomb, and the apparent victims of some common calamity, we have modifications of cranial forms and magnitudes which exhibit irrefragable cranial evidence that, however remote their date, there existed, then as now, gradations of moral and intellectual endowments, in consequence whereof some are destined to be governors and teachers, whilst others require to be governed and taught; to that extent demonstrating that difference of rank and station are an inevitable law of our nature.—A notice of the examination of the sepulchral mound at Mount Wilson will be found in this *Journal*, [vol. i., pp. 276 *et seq.*] As the 4th or modern group sufficiently explains itself, we may pass on to Table 3.

In this Table the cubic capacity, the absolute length and breadth, and the proportional length and breadth of the whole are re-grouped in accordance with their dimensional relations, exhibiting at one view, the point towards which they gravitate, so to say, and the limits within which they are permitted to oscillate.

From the 2nd Table we learn that the average cubic capacity of the 4th group of 25 Celtic skulls is 89.4 inches, and its extremes 107 and 75 inches. By referring to Table 3, it will be seen that 13 are below the average, and 12 above it; 14 of the whole ranging between 84 and 92 inches: these, therefore, constitute the prevailing sizes, the outlying ones being fewer and more scattered. Turning again to Table 2, we find the average length of 75 Celtic skulls to be 7.26 inches, the extremes 8.2 and 6.6 inches—61 of the whole number, however, are included between 7 and 7.6 inches, and 27 of the 61 between 7.2 and 7.3 inches, the average. In like manner, their breadth fluctuates between 5.1 and 5.9 inches, the chief preponderance being from 5.3 to 5.6 inches, and the average 5.45 inches. But, as neither the length nor the breadth, considered independently, can furnish a true criterion of the proportionate length or breadth of a skull,—since a long head may be very broad, and a short head be very narrow,—it becomes necessary to reduce them to their proportional values, (that is, their breadth expressed in decimal subdivisions of their length,) in order that the beauty and harmony of the law, in obedience to which they arrange themselves, may become fully apparent. Thus the proportional average breadth of the whole 75 is .75, or more exactly .753, a result easily arrived at by dividing the average length 7.26 inches, into the average breadth 5.45 inches; but this only imperfectly expresses the fact. If we turn again to Table 3,

under the head of proportional breadth, we shall find that not only is .75 the average, but that it occupies the point of highest numerical value in the table, the numbers progressively decreasing, as we depart from it in either direction; 67 of the whole group being comprised within the limits of .71 and .79: proving to a demonstration that, while a wide margin is allowed upon either side for individual development, the permanency of the type is carefully provided for by the preponderance of the mass. And, accordingly, we find in our modern group, individual specimens resembling their remote predecessors of the primeval period, considerably more closely even than the specimens from the large tumulus in the Phoenix Park resemble each other. Nor is this all,—it proves, so far as cranial testimony alone can do, that the Celtic population of Ireland, no matter by how many immigrations introduced, must be originally *from one parent stock*; else, if the long and short headed specimens occasionally to be met with were truly typical, instead of being exceptional varieties, we should have *two centres* of aggregation, shading gradually off into each other, instead of one only as is the case; and this conclusion is further confirmed by the very pertinent philological observation made by Dr. Wilde [*Beauties of the Boyne and Blackwater*, page 223:—“It is a fact, curious, but generally overlooked by Irish historians, who bring hither colonies of different nations, that there are but the remains of *one* language known in manuscripts or spoken amongst us.”—The purport of the 4th Table is to show the manner in which the other proportional measurements may also be calculated; but as that part of our enquiry has not yet been fully completed, it would be premature to enter upon it here: neither is this the time, nor would it be the place, to discuss the Phrenological bearing of the structural peculiarities which it has been our endeavour to record: the indulgence of the reader has already been more than sufficiently trespassed upon. We shall, therefore, so far as this Journal is concerned, take leave of the subject, pleading our justification for having adventured upon it at all, in the language of the same quaint old author, whose suggestive words adorn our introductory chapter:—“Time, which antiquates antiquities, and hath an art to make dust of all things, hath yet spared these minor monuments. In vain we hope to be known by open and visible conservatories, when to be unknown was the means of their continuation, and obscurity their protection. . . . Now, since these dead bones have already out-lived the living ones of Methuselah, and, in a yard underground and thin walls of clay, out-worn all the strong and specious buildings above them, and quietly rested under the drums and trappings of three conquests; we were very unwilling they should die again, and be buried twice among us.”

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# No. 1      TABULATED MEASUREMENTS OF 16 SK

| NO. IN CATALOGUE.                                                    | 2                          | 3                          | 4                          |             | 18       | 27      | 28        | 19                | 20                | 21                | 22                |                   |
|----------------------------------------------------------------------|----------------------------|----------------------------|----------------------------|-------------|----------|---------|-----------|-------------------|-------------------|-------------------|-------------------|-------------------|
| NAME OF SKULL,<br>OR LOCALITY FROM WHENCE OBTAINED.                  | Donaghmore,<br>Co. Tyrone. | Phoenix<br>Park,<br>No. 1. | Phoenix<br>Park,<br>No. 2. |             | Donatus. | Drumbo. | Devenish. | Down-<br>patrick. | Clones,<br>No. 1. | Clones,<br>No. 2. | Clones,<br>No. 3. | Clones,<br>No. 4. |
| General Measurements,<br><i>In Inches and Tenths.</i>                | PRIMEVAL.                  |                            |                            | NON-CELTIC. |          |         |           | CELTIC.—ANCIENT.  |                   |                   |                   |                   |
| Cubic Capacity,.....                                                 | 93                         | 93                         | 88                         | 90          | 96       | 86      | 77        | 96?               | 83?               | 82?               | 89?               |                   |
| Length from 10° to 145°,....                                         | 6.95                       | 7.6                        | 7.1                        | 7.2         | 7.5      | 7.0     | 6.7       | 7.6               | 7.4               | 7.4               | 7.5               |                   |
| Breadth,.....                                                        | 5.8                        | 5.65                       | 5.65                       | 6.05        | 6.2      | 5.85    | 5.6       | 5.6               | 5.7               | 5.7               | 5.5               |                   |
| Circumference,.....                                                  | 20.4                       | 21.1                       | 20.2                       | 19.9        | 21.6     | 20.4    | 19.5      | 21.0              | 20.8              | 20.7              | 20.7              | 2                 |
| Frontal Arch,.....                                                   | —                          | 5.2                        | 5.0                        | 5.0         | 5.5      | 4.9     | 4.8       | 5.4               | 5.0               | 5.5?              | 5.4               |                   |
| Parietal do. ....                                                    | —                          | 5.0                        | 5.0                        | 4.7         | 5.1      | 5.0     | 4.2       | 5.1               | 4.5               | 5.0               | 5.0               |                   |
| Occipital do. ....                                                   | 4.7                        | 4.9                        | 4.5                        | 4.8         | 4.9      | 4.5     | 4.4       | 4.8               | 5.2               | 4.5               | 4.0               |                   |
| Sum of do. or Occipito-frontal,                                      | 14.5                       | 15.1                       | 14.5                       | 14.5        | 15.5     | 14.4    | 13.4      | 15.3              | 14.7              | 15.0              | 14.4              | 1                 |
| Mastoidal do.                                                        | 15.2                       | 14.9                       | 14.8                       | 14.6        | 16.0     | 14.1    | 13.9      | 15.1              | 14.6              | 14.0              | 15.4              |                   |
| Proportional Measurements,<br><i>In Hundredths of Long Diameter.</i> |                            |                            |                            |             |          |         |           |                   |                   |                   |                   |                   |
| Length, .....                                                        | 1.0                        | 1.0                        | 1.0                        | 1.0         | 1.0      | 1.0     | 1.0       | 1.0               | 1.0               | 1.0               | 1.0               |                   |
| Breadth, .....                                                       | .83*                       | .74*                       | .80                        | .84         | .83      | .83*    | .83*      | .74               | .77               | .77               | .74*              |                   |
| RADIAL OR PROFILE.                                                   |                            |                            |                            |             |          |         |           |                   |                   |                   |                   |                   |
| At<br>Angular<br>Intervals<br>of<br>Ten<br>Degrees.                  | 0                          | .51*                       | .50*                       | .54         | .48      | .51     | .51       | .51               | .50               | .56               | .48*              | .48               |
|                                                                      | 10                         | .57                        | .57                        | .58*        | .55      | .56     | .56       | .56               | .55               | .55               | .54*              | .52*              |
|                                                                      | 20                         | .63                        | .60*                       | .62         | .58      | .59     | .61       | .60               | .60*              | .59               | .58               | .55*              |
|                                                                      | 30                         | .67                        | .62*                       | .65         | .61      | .63     | .65       | .64*              | .63               | .61               | .60               | .59               |
|                                                                      | 40                         | .67*                       | .63                        | .66         | .62      | .65     | .65*      | .65*              | .63               | .61*              | .60               | .60*              |
|                                                                      | 50                         | .68                        | .62*                       | .67         | .62      | .65*    | .65*      | .66               | .63               | .62               | .60               | .61               |
|                                                                      | 60                         | .68*                       | .62*                       | .68         | .62      | .65     | .65       | .66*              | .63               | .62*              | .60               | .61*              |
|                                                                      | 70                         | .69*                       | .63                        | .68         | .62      | .65*    | .64*      | .66*              | .65               | .64               | .60               | .62*              |
|                                                                      | 80                         | .71                        | .64                        | .68*        | .62      | .65*    | .65*      | .66*              | .66               | .65               | .60               | .64*              |
|                                                                      | 90                         | .71*                       | .64*                       | .68*        | .62      | .65*    | .65*      | .66               | .65*              | .65               | .60*              | .66               |
|                                                                      | 100                        | .69*                       | .64*                       | .66         | .61      | .64*    | .64*      | .64*              | .63               | .64               | .61               | .66               |
|                                                                      | 110                        | .65                        | .62                        | .63*        | .59      | .61*    | .63       | .61*              | .60*              | .62               | .60               | .63*              |
|                                                                      | 120                        | .61                        | .59                        | .59*        | .58      | .58*    | .58*      | .59               | .58*              | .59*              | .58*              | .61               |
|                                                                      | 130                        | .58                        | .57*                       | .57*        | .57      | .56     | .56       | .56               | .57               | .58               | .56*              | .59*              |
|                                                                      | 140                        | .54                        | .52*                       | .51         | .54      | .53*    | .52*      | .53               | .54               | .54               | .54               | .57               |
|                                                                      | 150                        | .48*                       | .45                        | .43*        | .50      | .49     | .49*      | .49               | .50               | .59*              | .52               | .53               |
|                                                                      | 160                        | .42                        | .39*                       | .35         | .44*     | .44     | .44       | .40               | .40               | .37               | .47               | .48               |
|                                                                      | 170                        | .36*                       | .30                        | .29*        | .35      | .33*    | .32*      | .34               | .33               | .29               | .34               | .34               |
|                                                                      | 180                        | .32                        | .17                        | .23         | .22      | .25     | .24       | .28               | .27               | .24*              | .26               | .27               |
| To front edge of Incisors,....                                       | —                          | .55                        | .60                        | —           | .58      | .57     | .59       | —                 | —                 | —                 | —                 | —                 |
| To Symphysis Menti, .....                                            | —                          | .63*                       | —                          | —           | .68      | —       | —         | —                 | —                 | —                 | —                 | —                 |
| TRANSVERSE DIAMETERS.                                                |                            |                            |                            |             |          |         |           |                   |                   |                   |                   |                   |
| Mastoidal, .....                                                     | —                          | .61*                       | .70                        | .64         | .71      | .63     | .67       | .65               | .66               | —                 | —                 | —                 |
| Meatorial, .....                                                     | .76                        | .69*                       | .73                        | .73*        | .77      | .72*    | .72       | .67               | .70               | —                 | —                 | —                 |
| Temporal<br>A at                                                     | 10°                        | .61*                       | .58                        | .62         | .63*     | .65     | .64       | .65               | .58               | .64               | .60               |                   |
|                                                                      | 30°                        | .72                        | .64                        | .68*        | .72      | .72     | .70       | .72               | .65               | .69               | .69               |                   |
|                                                                      | 60°                        | .82                        | .71*                       | .75         | .84      | .80     | .80       | .80               | .71               | .75               | .74               |                   |
|                                                                      | 90°                        | .83                        | .73*                       | .79*        | .84      | .83     | .83*      | .83*              | .74               | .77               | .76               | act.              |

# ULATED MEASUREMENTS OF 16 SKULLS.

| 2                                                                                                                                            | 3                                                                                                                                                  | 4                                                                                                                                                      |                                                                                                                                       | 18                                                                                                                                                      | 27                                                                                                                                              | 28                                                                                                                                               | 19                                                                                                                                                      | 20                                                                                                                                                            | 21                                                                                                                                                             | 22                                                             | 24                                                                                                                                 | 25                                                                                                                                                      | 44                                                                                                                                  | 46                                                                                                                                                | 57                                                             |                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------|
| Donaghmore.<br>Co. Tyrone.                                                                                                                   | Phoenix<br>Park.<br>No. 1.                                                                                                                         | Phoenix<br>Park.<br>No. 2.                                                                                                                             |                                                                                                                                       | Donatus.                                                                                                                                                | Drumbo.                                                                                                                                         | Devenish.                                                                                                                                        | Down-<br>patrick.                                                                                                                                       | Clones.<br>No. 1.                                                                                                                                             | Clones.<br>No. 2.                                                                                                                                              | Clones.<br>No. 3.                                              | Clones.<br>No. 4.                                                                                                                  | Drumlane.                                                                                                                                               | Armoey.                                                                                                                             | Armagh.                                                                                                                                           | Inniskeen.<br>No. 1.                                           | Aghadoe,<br>Co. Kerry.<br>No. 1.       |
| PRIMEVAL.                                                                                                                                    |                                                                                                                                                    |                                                                                                                                                        | NON-CELTIC.                                                                                                                           |                                                                                                                                                         |                                                                                                                                                 |                                                                                                                                                  | CELTIC.—ANCIENT AND MODERN.                                                                                                                             |                                                                                                                                                               |                                                                                                                                                                |                                                                |                                                                                                                                    |                                                                                                                                                         |                                                                                                                                     |                                                                                                                                                   |                                                                |                                        |
| 93<br>6.95<br>5.8<br>20.4<br>—<br>—<br>4.7<br>14.5<br>15.2                                                                                   | 93<br>7.6<br>5.65<br>21.1<br>5.2<br>5.0<br>4.9<br>15.1<br>14.9                                                                                     | 88<br>7.1<br>5.65<br>20.2<br>5.0<br>5.0<br>4.5<br>14.5<br>14.8                                                                                         | 90<br>7.2<br>6.05<br>19.9<br>5.0<br>4.7<br>4.8<br>14.5<br>14.6                                                                        | 96<br>7.5<br>6.2<br>21.6<br>5.5<br>5.1<br>4.9<br>15.5<br>16.0                                                                                           | 86<br>7.0<br>5.85<br>20.4<br>4.9<br>5.0<br>4.5<br>14.4<br>14.1                                                                                  | 77<br>6.7<br>5.6<br>19.5<br>4.8<br>4.2<br>4.4<br>13.4<br>13.9                                                                                    | 96?<br>7.6<br>5.6<br>21.0<br>5.4<br>5.1<br>4.8<br>15.3<br>15.1                                                                                          | 83?<br>7.4<br>5.7<br>20.8<br>5.0<br>4.5<br>5.2<br>14.7<br>14.6                                                                                                | 82?<br>7.4<br>5.7<br>20.7<br>5.5?<br>5.0<br>4.5<br>15.0<br>14.0                                                                                                | 89?<br>7.5<br>5.5<br>20.7<br>5.4<br>5.0<br>4.0<br>14.4<br>15.4 | ?<br>8.2<br>5.5<br>22.0<br>5.9<br>5.2<br>5.2<br>16.3<br>—                                                                          | 82?<br>7.25<br>5.5<br>20.3<br>—<br>4.4<br>14.1<br>14.6                                                                                                  | 92<br>7.4<br>5.5<br>20.6<br>5.4<br>4.9<br>4.7<br>15.0<br>15.0                                                                       | 107<br>7.5<br>5.7<br>21.5<br>5.4<br>4.8<br>5.3<br>15.5<br>14.9                                                                                    | 100<br>7.5<br>5.7<br>21.4<br>5.5<br>5.0<br>5.0<br>15.5<br>15.4 |                                        |
| 1.0<br>.83*                                                                                                                                  | 1.0<br>.74*                                                                                                                                        | 1.0<br>.80                                                                                                                                             | 1.0<br>.84                                                                                                                            | 1.0<br>.83                                                                                                                                              | 1.0<br>.83*                                                                                                                                     | 1.0<br>.83*                                                                                                                                      | 1.0<br>.74                                                                                                                                              | 1.0<br>.77                                                                                                                                                    | 1.0<br>.77                                                                                                                                                     | 1.0<br>.74*                                                    | 1.0<br>.67*                                                                                                                        | 1.0<br>.77                                                                                                                                              | 1.0<br>.74*                                                                                                                         | 1.0<br>.76                                                                                                                                        | 1.0<br>.76                                                     |                                        |
| .51*<br>.57<br>.63<br>.67<br>.67*<br>.68<br>.68*<br>.69*<br>.71<br>.71*<br>.69*<br>.65<br>.61<br>.58<br>.48*<br>.42<br>.36*<br>.32<br>—<br>— | .50*<br>.57<br>.60*<br>.62*<br>.63<br>.62*<br>.63<br>.64<br>.64*<br>.64*<br>.66<br>.62<br>.59<br>.57*<br>.52*<br>.39*<br>.30<br>.17<br>.55<br>.63* | .54<br>.58*<br>.62<br>.65<br>.66<br>.67<br>.68<br>.68*<br>.68*<br>.68*<br>.66<br>.63*<br>.59*<br>.57*<br>.51<br>.43*<br>.35<br>.29*<br>.23<br>.60<br>— | .48<br>.55<br>.58<br>.61<br>.62<br>.62<br>.65<br>.62<br>.62<br>.62<br>.61<br>.59<br>.57<br>.54<br>.50<br>.44*<br>.35<br>.22<br>—<br>— | .51<br>.56<br>.59<br>.63<br>.65<br>.65<br>.65<br>.65*<br>.65*<br>.65*<br>.64*<br>.63*<br>.61*<br>.58*<br>.56<br>.49<br>.44<br>.33*<br>.25<br>.58<br>.68 | .51<br>.56<br>.61<br>.65<br>.65*<br>.65*<br>.66*<br>.64*<br>.65*<br>.65*<br>.64*<br>.63<br>.58*<br>.56<br>.49<br>.44<br>.32*<br>.24<br>.57<br>— | .51<br>.56<br>.60<br>.64*<br>.63<br>.63<br>.63<br>.66*<br>.66<br>.66<br>.63<br>.61*<br>.59<br>.56<br>.53<br>.49<br>.40<br>.34<br>.28<br>.59<br>— | .50<br>.55<br>.60*<br>.63<br>.63<br>.63<br>.65<br>.66<br>.65*<br>.65<br>.60*<br>.62<br>.59*<br>.58*<br>.57<br>.54<br>.50<br>.40<br>.33<br>.27<br>—<br>— | .56<br>.55<br>.59<br>.61<br>.60<br>.62*<br>.64<br>.65<br>.65<br>.60<br>.61<br>.60<br>.60<br>.61<br>.62<br>.58*<br>.54<br>.59*<br>.37<br>.29<br>.24*<br>—<br>— | .48<br>.54*<br>.58<br>.60<br>.60<br>.60<br>.61<br>.61*<br>.60<br>.60<br>.64*<br>.66<br>.60*<br>.61<br>.58*<br>.54<br>.52<br>.47<br>.34<br>.34<br>.26<br>—<br>— | Imperfect.                                                     | .54<br>.60<br>.64<br>.66<br>.66*<br>.66<br>.65*<br>.66<br>.66<br>.65*<br>.61*<br>.58*<br>.55<br>.50<br>.45<br>.34<br>.22<br>—<br>— | .51*<br>.58*<br>.61*<br>.64*<br>.65<br>.64*<br>.65*<br>.64*<br>.65*<br>.66<br>.63<br>.60*<br>.56*<br>.55*<br>.52<br>.47<br>.44<br>.25<br>.55*<br>—<br>— | .47*<br>.53*<br>.59<br>.61<br>.62*<br>.63*<br>.64<br>.65*<br>.66<br>.66<br>.64<br>.61<br>.59<br>.56*<br>.52<br>.47<br>.36<br>—<br>— | .48<br>.52*<br>.57<br>.60<br>.61*<br>.62*<br>.63<br>.63*<br>.64<br>.64<br>.65*<br>.66<br>.63<br>.64<br>.59<br>.53*<br>.48<br>.35<br>.28<br>—<br>— |                                                                |                                        |
| —<br>.76<br>.61*<br>.72<br>.82<br>.83                                                                                                        | .61*<br>.69*<br>.58<br>.64<br>.71*<br>.73*                                                                                                         | .70<br>.73<br>.62<br>.68*<br>.75<br>.79*                                                                                                               | .64<br>.73*<br>.63*<br>.72<br>.84<br>.84                                                                                              | .71<br>.77<br>.65<br>.72<br>.80<br>.83                                                                                                                  | .63<br>.72*<br>.64<br>.70<br>.80<br>.83*                                                                                                        | .67<br>.72<br>.65<br>.72<br>.80<br>.83*                                                                                                          | .65<br>.67<br>.58<br>.64<br>.71<br>.74                                                                                                                  | .66<br>.70<br>.64<br>.69<br>.75<br>.77                                                                                                                        | —<br>—<br>.60<br>.69<br>.74<br>.76                                                                                                                             |                                                                | —<br>—<br>—<br>—<br>—<br>—                                                                                                         | ect.<br><br>ect.                                                                                                                                        | .66<br>.72<br>?<br>.70<br>.74<br>.76                                                                                                | .69<br>.68<br>.57<br>.63<br>.69<br>.73*                                                                                                           | .66<br>.71<br>.60*<br>.66*<br>.73<br>.77                       | .64<br>.70<br>.56<br>.63<br>.72<br>.76 |

| In Hundredths of Long Diameter.                     |                    |      |      |      |      |      |      |      |      |      |       |      |
|-----------------------------------------------------|--------------------|------|------|------|------|------|------|------|------|------|-------|------|
| Length, .....                                       | 1.0                | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0   |      |
| Breadth, .....                                      | .83*               | .74* | .80  | .84  | .83  | .83* | .83* | .74  | .77  | .77  | .74*  |      |
| RADIAL OR PROFILE.                                  |                    |      |      |      |      |      |      |      |      |      |       |      |
| At<br>Angular<br>Intervals<br>of<br>Ten<br>Degrees. | 0                  | .51* | .50* | .54  | .48  | .51  | .51  | .51  | .50  | .56  | .48*  | .48  |
|                                                     | 10                 | .57  | .57  | .58* | .55  | .56  | .56  | .56  | .55  | .55  | .54*  | .52* |
|                                                     | 20                 | .63  | .60* | .62  | .58  | .59  | .61  | .60  | .60* | .59  | .58   | .55* |
|                                                     | 30                 | .67  | .62* | .65  | .61  | .63  | .65  | .64* | .63  | .61  | .60   | .59  |
|                                                     | 40                 | .67* | .63  | .66  | .62  | .65  | .65* | .65* | .63  | .61* | .60   | .60* |
|                                                     | 50                 | .68  | .62* | .67  | .62  | .65* | .65* | .66  | .63  | .62  | .60   | .61  |
|                                                     | 60                 | .68* | .62* | .68  | .62  | .65  | .65  | .66* | .63  | .62* | .60   | .61* |
|                                                     | 70                 | .69* | .63  | .68  | .62  | .65* | .64* | .66* | .65  | .64  | .60   | .62* |
|                                                     | 80                 | .71  | .64  | .68* | .62  | .65* | .65* | .66* | .66  | .65  | .60   | .64* |
|                                                     | 90                 | .71* | .64* | .68* | .62  | .65* | .65* | .66  | .65* | .65  | .60*  | .66  |
|                                                     | 100                | .69* | .64* | .66  | .61  | .64* | .64* | .64* | .63  | .64  | .61   | .66  |
|                                                     | 110                | .65  | .62  | .63* | .59  | .61* | .63  | .61* | .60* | .62  | .60   | .63* |
|                                                     | 120                | .61  | .59  | .59* | .58  | .58* | .58* | .59  | .58* | .59* | .58*  | .61  |
|                                                     | 130                | .58  | .57* | .57* | .57  | .56  | .56  | .56  | .57  | .58  | .56*  | .59* |
|                                                     | 140                | .54  | .52* | .51  | .54  | .53* | .52* | .53  | .54  | .54  | .54   | .57  |
|                                                     | 150                | .48* | .45  | .43* | .50  | .49  | .49* | .49  | .50  | .59* | .52   | .53  |
|                                                     | 160                | .42  | .39* | .35  | .44* | .44  | .44  | .40  | .40  | .37  | .47   | .48  |
|                                                     | 170                | .36* | .30  | .29* | .35  | .33* | .32* | .34  | .33  | .29  | .34   | .34  |
|                                                     | 180                | .32  | .17  | .23  | .22  | .25  | .24  | .28  | .27  | .24* | .26   | .27  |
| To front edge of Incisors, ....                     | —                  | .55  | .60  | —    | .58  | .57  | .59  | —    | —    | —    | —     |      |
| To Symphysis Menti, .....                           | —                  | .63* | —    | —    | .68  | —    | —    | —    | —    | —    | —     |      |
| TRANSVERSE DIAMETERS.                               |                    |      |      |      |      |      |      |      |      |      |       |      |
| Mastoidal, .....                                    | —                  | .61* | .70  | .64  | .71  | .63  | .67  | .65  | .66  | —    | —     |      |
| Meatorial, .....                                    | .76                | .69* | .73  | .73* | .77  | .72* | .72  | .67  | .70  | —    | —     |      |
| Temporal<br>A at<br>Z O N E.                        | 10°                | .61* | .58  | .62  | .63* | .65  | .64  | .65  | .58  | .64  | .60   |      |
|                                                     | 30°                | .72  | .64  | .68* | .72  | .72  | .70  | .72  | .65  | .69  | .69   |      |
|                                                     | 60°                | .82  | .71* | .75  | .84  | .80  | .80  | .80  | .71  | .75  | .74   |      |
|                                                     | 90°                | .83  | .73* | .79* | .84  | .83  | .83* | .83* | .74  | .77  | .76   |      |
|                                                     | 120°               | .79  | .69* | .74* | .79  | .80  | .75  | .79  | .70  | .73  | .75   |      |
| Juxta-Temporal<br>B at<br>Z O N E.                  | 150°               | .74  | .65* | .70* | .72* | .72  | .68  | .71  | .65  | .68  | .65   |      |
|                                                     | 10°                | .56  | .51  | .62  | .53  | .50  | .54* | .54  | .47  | .53  | .56 ? |      |
|                                                     | 30°                | .65  | .62  | .68* | .64  | .62  | .67  | .62  | .59  | .62  | .63   |      |
|                                                     | 60°                | .74  | .68  | .75  | .72* | .72  | .72* | .71  | .68  | .68  | .67   |      |
|                                                     | 90°                | .79  | .72  | .76* | .78  | .73* | .75  | .77  | .71  | .71  | .71   |      |
| Zygomatic, .....                                    | 120°               | .69  | .63  | .64* | .71  | .68  | .66* | .69  | .63  | .63  | .66   |      |
|                                                     | 150°               | .59  | .54* | .57  | .58  | .52  | .55  | .57  | .49  | .53  | .51   |      |
|                                                     | Inter-Malar, ..... | .74  | .74  | .77  | .71  | .71  | .74  | —    | —    | —    | —     |      |
| Lower-Maxillary, .....                              | —                  | .67  | .60* | .63  | .60  | .71  | .67  | —    | —    | —    | —     |      |
| MISCELLANEOUS.                                      |                    |      |      |      |      |      |      |      |      |      |       |      |
| Long diam. of Foramen Mag.                          | —                  | .20  | .20  | .18* | .19  | .20  | .19  | —    | —    | —    | —     |      |
| Transverse do                                       | —                  | .16* | .18* | .19* | .18* | .18  | .17  | —    | —    | —    | —     |      |
| Length of Face, .....                               | —                  | .68  | —    | —    | .72  | —    | —    | —    | —    | —    | —     |      |
| Occipital depress. below 150°,                      | .17*               | .11* | .12* | .11* | .13  | .12* | .14  | .15  | .12* | .14  | 17 ?  |      |
| ANGULAR POSITION OF                                 |                    |      |      |      |      |      |      |      |      |      |       |      |
| Coronal Suture, .....                               | 67°                | 63°  | 60°  | 64°  | 63°  | 62°  | 63°  | 62°  | 64°  | —    | 68°   |      |
| Lambdoidal do. ....                                 | 124°               | 120° | 120° | 124° | 127° | 123° | 118° | 123° | 121° | —    | 127°  |      |
| Foramen Magnum, .....                               | 185°               | 182° | 182° | 181° | 186° | 183° | 184° | 188° | 182° | —    | ?     |      |
| Front Edge of Incisors, ....                        | —                  | 50°  | 46°  | —    | 52°  | 48°  | —    | —    | —    | —    | —     |      |
| Symphysis Menti, .....                              | —                  | 72°  | —    | —    | 73°  | —    | —    | —    | —    | —    | —     |      |

| 1.0<br>.83* | 1.0<br>.74* | 1.0<br>.80 | 1.0<br>.84 | 1.0<br>.83 | 1.0<br>.83* | 1.0<br>.83* | 1.0<br>.74 | 1.0<br>.77 | 1.0<br>.77 | 1.0<br>.74* | 1.0<br>.67* | 1.0<br>.77 | 1.0<br>.74* | 1.0<br>.76 | 1.0<br>.76 |
|-------------|-------------|------------|------------|------------|-------------|-------------|------------|------------|------------|-------------|-------------|------------|-------------|------------|------------|
| .51*        | .50*        | .54        | .48        | .51        | .51         | .51         | .50        | .56        | .48*       | .48         | Imperfect.  | .54        | .51*        | .47*       | .48        |
| .57         | .57         | .58*       | .55        | .56        | .56         | .56         | .55        | .55        | .54*       | .52*        |             | .60        | .58*        | .53*       | .52*       |
| .63         | .60*        | .62        | .58        | .59        | .61         | .60         | .60*       | .59        | .58        | .55*        |             | .64        | .61*        | .59        | .57        |
| .67         | .62*        | .65        | .61        | .63        | .65         | .64*        | .63        | .61        | .60        | .59         |             | .66        | .64*        | .61        | .60        |
| .67*        | .63         | .66        | .62        | .65        | .65*        | .65*        | .63        | .61*       | .60        | .60*        |             | .66*       | .65         | .62*       | .61*       |
| .68         | .62*        | .67        | .62        | .65*       | .65*        | .66         | .63        | .62        | .60        | .61         |             | .66        | .64*        | .63        | .62*       |
| .68*        | .62*        | .68        | .62        | .65        | .65         | .66*        | .63        | .62*       | .60        | .61*        |             | .65*       | .64*        | .63*       | .63        |
| .69*        | .63         | .68        | .62        | .65*       | .64*        | .66*        | .65        | .64        | .60        | .62*        |             | .66        | .64*        | .64        | .63        |
| .71         | .64         | .68*       | .62        | .65*       | .65*        | .66*        | .66        | .65        | .60        | .64*        |             | .66        | .65*        | .65*       | .64        |
| .71*        | .64*        | .68*       | .62        | .65*       | .65*        | .66         | .65*       | .65        | .60*       | .66         |             | .66*       | .66         | .66        | .65*       |
| .69*        | .64*        | .66        | .61        | .64*       | .64*        | .64*        | .63        | .64        | .61        | .66         |             | .65*       | .63         | .66        | .66        |
| .65         | .62         | .63*       | .59        | .61*       | .63         | .61*        | .60*       | .62        | .60        | .63*        |             | .61*       | .60*        | .64        | .63        |
| .61         | .59         | .59*       | .58        | .58*       | .58*        | .59         | .58*       | .59*       | .58*       | .61         |             | .58*       | .56*        | .61        | .60        |
| .58         | .57*        | .57*       | .57        | .56        | .56         | .56         | .57        | .58        | .56*       | .59*        |             | .55        | .55*        | .59        | .59        |
| .54         | .52*        | .51        | .54        | .53*       | .52*        | .53         | .54        | .54        | .54        | .57         |             | .50        | .52         | .56*       | .57        |
| .48*        | .45         | .43*       | .50        | .49        | .49*        | .49         | .50        | .59*       | .52        | .53         |             | .45        | .47         | .52        | .53*       |
| .42         | .39*        | .35        | .44*       | .44        | .44         | .40         | .40        | .37        | .47        | .48         |             | .34        | .44         | .47        | .48        |
| .36*        | .30         | .29*       | .35        | .33*       | .32*        | .34         | .33        | .29        | .34        | .34         |             | .22        | .25         | .36        | .35        |
| .32         | .17         | .23        | .22        | .25        | .24         | .28         | .27        | .24*       | .26        | .27         |             | .19        | .16         | .26        | .28        |
| —           | .55         | .60        | —          | .58        | .57         | .59         | —          | —          | —          | —           |             | —          | .55*        | —          | —          |
| —           | .63*        | —          | —          | .68        | —           | —           | —          | —          | —          | —           |             | —          | —           | —          | —          |
| —           | .61*        | .70        | .64        | .71        | .63         | .67         | .65        | .66        | —          | —           | Imperfect.  | .66        | .69         | .66        | .64        |
| .76         | .69*        | .73        | .73*       | .77        | .72*        | .72         | .67        | .70        | —          | —           |             | .72        | .68         | .71        | .70        |
| .61*        | .58         | .62        | .63*       | .65        | .64         | .65         | .58        | .64        | .60        | .60         |             | ?          | .57         | .60*       | .56        |
| .72         | .64         | .68*       | .72        | .72        | .70         | .72         | .65        | .69        | .69        | .69         |             | .70        | .63         | .66*       | .63        |
| .82         | .71*        | .75        | .84        | .80        | .80         | .80         | .71        | .75        | .74        | .74         |             | .74        | .69         | .73        | .72        |
| .83         | .73*        | .79*       | .84        | .83        | .83*        | .83*        | .74        | .77        | .76        | .76         |             | .76        | .73*        | .77        | .76        |
| .79         | .69*        | .74*       | .79        | .80        | .75         | .79         | .70        | .73        | .75        | .75         |             | .72        | .69*        | .75*       | .73        |
| .74         | .65*        | .70*       | .72*       | .72        | .68         | .71         | .65        | .68        | .65        | .65         |             | .69        | .68         | .66        | .69        |
| .56         | .51         | .62        | .53        | .50        | .54*        | .54         | .47        | .53        | .56 ?      | .56 ?       |             | ?          | .46*        | .51        | .50        |
| .65         | .62         | .68*       | .64        | .62        | .67         | .62         | .59        | .62        | .63        | .63         |             | .63        | .48*        | .62        | .60        |
| .74         | .68         | .75        | .72*       | .72        | .72*        | .71         | .68        | .68        | .67        | .67         |             | .70        | .66         | .67*       | .67        |
| .79         | .72         | .76*       | .78        | .73*       | .75         | .77         | .71        | .71        | .71        | .71         |             | .72        | .70         | .71        | .73        |
| .69         | .63         | .64*       | .71        | .68        | .66*        | .69         | .63        | .63        | .66        | .66         |             | .61        | .64         | .66        | .68*       |
| .59         | .54*        | .57        | .58        | .52        | .55         | .57         | .49        | .53        | .51        | .51         |             | .51        | .48         | .51        | .52        |
| .74         | .74         | .77        | .71        | .74        | .74         | —           | —          | —          | —          | —           |             | —          | .68         | .71        | —          |
| -.67        | .60*        | .63        | .60        | .71        | .67         | —           | —          | —          | —          | —           |             | —          | .61*        | .61        | —          |
| —           | .59         | —          | —          | .56*       | —           | —           | —          | —          | —          | —           |             | —          | —           | —          | —          |
| —           | .20         | .20        | .18*       | .19        | .20         | .19         | —          | —          | —          | —           | Imperfect.  | —          | .18         | .20        | ?          |
| —           | .16*        | .18*       | .19*       | .18*       | .18         | .17         | —          | —          | —          | —           |             | —          | .16*        | .17        | ?          |
| —           | .68         | —          | —          | .72        | —           | —           | —          | —          | —          | —           |             | —          | —           | —          | —          |
| .17*        | .11*        | .12*       | .11*       | .13        | .12*        | .14         | .15        | .12*       | .14        | 17 ?        |             | .10        | .09         | .14        | .18        |
| 67°         | 63°         | 60°        | 64°        | 63°        | 62°         | 63°         | 62°        | 64°        | 68°        | 68°         |             | —          | 62°         | 65°        | 67°        |
| 124°        | 120°        | 120°       | 124°       | 127°       | 123°        | 118°        | 123°       | 121°       | 127°       | 127°        |             | 117°       | 126°        | 121°       | 126°       |
| 185°        | 182°        | 182°       | 181°       | 186°       | 183°        | 184°        | 188°       | 182°       | ?          | ?           |             | 176°       | 175°        | 187°       | ?          |
| —           | 50°         | 46°        | —          | 52°        | 48°         | —           | —          | —          | —          | —           |             | —          | 45°         | —          | —          |
| —           | 72°         | —          | —          | 73°        | —           | —           | —          | —          | —          | —           |             | —          | —           | —          | —          |

No. 2.

## TABULAR CLASSIFICATION OF GENERAL MEAS

| LOCALITY<br>FROM WHENCE PROCURED.              | No. of<br>Crania | Cubic Capacity,<br>in inches and tenths. |        |         | Length,<br>in inches and tenths. |        |         | Breadth,<br>in inches and tenths. |        |         | Circumference,<br>in inches and tenths. |        |         | Occipito-Frontal<br>in inches and |        |
|------------------------------------------------|------------------|------------------------------------------|--------|---------|----------------------------------|--------|---------|-----------------------------------|--------|---------|-----------------------------------------|--------|---------|-----------------------------------|--------|
|                                                |                  | Highest                                  | Lowest | Average | Highest                          | Lowest | Average | Highest                           | Lowest | Average | Highest                                 | Lowest | Average | Highest                           | Lowest |
| GROUP 1.—PRIMEVAL.                             |                  |                                          |        |         |                                  |        |         |                                   |        |         |                                         |        |         |                                   |        |
| Phoenix Park, No. 1                            | 1                | ...                                      | ...    | 91      | ...                              | ...    | 7.1     | ...                               | ...    | 5.6     | ...                                     | ...    | 20.5    | ...                               | ...    |
| Donaghmore.....                                | 1                | ...                                      | ...    | 93      | ...                              | ...    | 6.95    | ...                               | ...    | 5.8     | ...                                     | ...    | 20.4    | ...                               | ...    |
| Phoenix Park, 3 & 4                            | 2                | 93                                       | 88     | 90.5    | 7.6                              | 7.1    | 7.35    | 5.65                              | 5.65   | 5.65    | 21.1                                    | 20.2   | 20.65   | 15.1                              | 14.5   |
| Railway cutting.....                           | 1                | ...                                      | ...    | ...     | ...                              | ...    | 7.6     | ...                               | ...    | 5.7     | ...                                     | ...    | 21.4    | ...                               | ...    |
| Ballynahatty.....                              | 2                | ...                                      | ...    | 77      | 7.25                             | 7.1    | 7.17    | 5.4                               | 5.35   | 5.37    | 20.1                                    | 19.9   | 20.0    | 14.1                              | ...    |
| Whole Group.....                               | 7                | 93                                       | 77     | 88.4    | 7.6                              | 6.95   | 7.25    | 5.8                               | 5.35   | 5.6     | 21.4                                    | 19.9   | 20.5    | 15.4                              | 14.1   |
| GROUP 2.—ANCIENT BUT NOT PRIMEVAL.—NON-CELTIC. |                  |                                          |        |         |                                  |        |         |                                   |        |         |                                         |        |         |                                   |        |
| Drumbo.....                                    | 1                | ...                                      | ...    | 96      | ...                              | ...    | 7.5     | ...                               | ...    | 6.2     | ...                                     | ...    | 21.6    | ...                               | ...    |
| Dovenish.....                                  | 1                | ...                                      | ...    | 86      | ...                              | ...    | 7.0     | ...                               | ...    | 5.85    | ...                                     | ...    | 20.4    | ...                               | ...    |
| Downpatrick.....                               | 1                | ...                                      | ...    | 77      | ...                              | ...    | 6.7     | ...                               | ...    | 5.6     | ...                                     | ...    | 19.5    | ...                               | ...    |
| Donatus.....                                   | 1                | ...                                      | ...    | 90      | ...                              | ...    | 7.2     | ...                               | ...    | 6.05    | ...                                     | ...    | 19.9    | ...                               | ...    |
| Whole Group.....                               | 4                | 96                                       | 77     | 87.2    | 7.5                              | 6.7    | 7.1     | 6.2                               | 5.6    | 5.9     | 21.6                                    | 19.5   | 20.35   | 15.5                              | 13.4   |
| GROUP 3.—ANCIENT BUT NOT PRIMEVAL.—CELTIC.     |                  |                                          |        |         |                                  |        |         |                                   |        |         |                                         |        |         |                                   |        |
| Mount Wilson.....                              | 8                | 105                                      | 79     | 90.85   | 7.55                             | 7.1    | 7.24    | 5.8                               | 5.35   | 5.53    | 20.9                                    | 20.0   | 20.45   | 16.2                              | 14.0   |
| Clones.....                                    | 4                | 96                                       | 82     | 92.5    | 7.6                              | 7.4    | 7.47    | 5.7                               | 5.5    | 5.6     | 21.0                                    | 20.7   | 20.8    | 15.3                              | 14.4   |
| Drumlane.....                                  | 1                | ...                                      | ...    | ...     | ...                              | ...    | 8.2     | ...                               | ...    | 5.5     | ...                                     | ...    | 22.0    | ...                               | ...    |
| Arnoy.....                                     | 1                | ...                                      | ...    | 82.0    | ...                              | ...    | 7.25    | ...                               | ...    | 5.5     | ...                                     | ...    | 20.3    | ...                               | ...    |
| Old Castle, Belfast                            | 1                | ...                                      | ...    | 87.0    | ...                              | ...    | 7.5     | ...                               | ...    | 5.4     | ...                                     | ...    | 20.5    | ...                               | ...    |
| Blackwater.....                                | 2                | 102                                      | 87     | 94.5    | 7.35                             | 7.1    | 7.22    | 6.0                               | 5.6    | 5.8     | 21.4                                    | 20.4   | 20.95   | 14.8                              | 14.5   |
| Do. imperfect.....                             | 1                | ...                                      | ...    | ...     | ...                              | ...    | 7.0     | ...                               | ...    | 5.5     | ...                                     | ...    | 20.0    | ...                               | ...    |
| Whole Group.....                               | 18               | 105                                      | 79     | 89.6    | 8.2                              | 7.0    | 7.34    | 6.0                               | 5.4    | 5.57    | 22.0                                    | 20.0   | 20.6    | 16.3                              | 14.1   |
| GROUP 4.—MODERN.—CELTIC.                       |                  |                                          |        |         |                                  |        |         |                                   |        |         |                                         |        |         |                                   |        |
| Carolan ?.....                                 | 1                | ...                                      | ...    | 85      | ...                              | ...    | 7.3     | ...                               | ...    | 5.25    | ...                                     | ...    | 20.6    | ...                               | ...    |
| Co. Wicklow.....                               | 1                | ...                                      | ...    | 80      | ...                              | ...    | 7.1     | ...                               | ...    | 5.2     | ...                                     | ...    | 19.9    | ...                               | ...    |
| Armagh.....                                    | 5                | 98                                       | 84     | 91.4    | 7.6                              | 7.1    | 7.3     | 5.8                               | 5.4    | 5.5     | 21.3                                    | 20.1   | 20.7    | 15.5                              | 14.6   |
| Inniskeen.....                                 | 3                | 107                                      | 87     | 93.6    | 7.5                              | 7.1    | 7.3     | 5.7                               | 5.6    | 5.63    | 21.5                                    | 20.5   | 20.9    | 15.5                              | 14.6   |
| Buttevant.....                                 | 7                | 95                                       | 75     | 86.1    | 7.6                              | 6.9    | 7.2     | 5.7                               | 5.3    | 5.5     | 22.0                                    | 19.8   | 20.6    | 15.5                              | 13.9   |
| Aghadee.....                                   | 3                | 100                                      | 81     | 93.3    | 7.8                              | 7.2    | 7.5     | 5.7                               | 5.3    | 5.5     | 22.0                                    | 21.0   | 21.1    | 16.0                              | 14.8   |
| Do. abnormal....                               | 1                | ...                                      | ...    | 94.0    | ...                              | ...    | 8.0     | ...                               | ...    | 5.2     | ...                                     | ...    | 21.7    | ...                               | ...    |
| Cashel.....                                    | 1                | ...                                      | ...    | 90.0    | ...                              | ...    | 7.3     | ...                               | ...    | 5.5     | ...                                     | ...    | 20.8    | ...                               | ...    |
| Arran, Co. Galway                              | 2                | 92                                       | 84     | 88.0    | 7.4                              | 7.3    | 7.3     | 5.5                               | 5.5    | 5.5     | 20.6                                    | 20.6   | 20.6    | 14.9                              | 14.7   |
| Belfast.....                                   | 1                | ...                                      | ...    | 88.0    | ...                              | ...    | 7.5     | ...                               | ...    | 5.5     | ...                                     | ...    | 20.9    | ...                               | ...    |
| Whole Group.....                               | 25               | 107                                      | 75     | 89.4    | 8.0                              | 6.9    | 7.3     | 5.9                               | 5.2    | 5.5     | 21.7                                    | 19.8   | 20.78   | 16.5                              | 13.9   |
| Buttevant.....                                 | 50               | ...                                      | ...    | ...     | 7.8                              | 6.6    | 7.23    | 5.8                               | 5.1    | 5.42    | ...                                     | ...    | ...     | ...                               | ...    |
| Total of.....                                  | 75               | ...                                      | ...    | ...     | 8.0                              | 6.6    | 7.26    | 5.9                               | 5.1    | 5.45    | ...                                     | ...    | ...     | ...                               | ...    |

# CLASSIFICATION OF GENERAL MEASUREMENTS.

| Length,<br>inches and tenths.                  |         |      | Breadth,<br>in inches and tenths. |        |         | Circumference,<br>in inches and tenths. |        |         | Occipito-Frontal Arch,<br>in inches and tenths. |        |         | Mastoidal Arch,<br>in inches and tenths. |        |         | Proportional Breadth,<br>in decimal subdivisions of length. |        |         |
|------------------------------------------------|---------|------|-----------------------------------|--------|---------|-----------------------------------------|--------|---------|-------------------------------------------------|--------|---------|------------------------------------------|--------|---------|-------------------------------------------------------------|--------|---------|
| Lowest                                         | Average |      | Highest                           | Lowest | Average | Highest                                 | Lowest | Average | Highest                                         | Lowest | Average | Highest                                  | Lowest | Average | Highest                                                     | Lowest | Average |
| GROUP 1.—PRIMEVAL.                             |         |      |                                   |        |         |                                         |        |         |                                                 |        |         |                                          |        |         |                                                             |        |         |
| ...                                            | 7.1     | ...  | ...                               | 5.6    | ...     | ...                                     | ...    | 20.5    | ...                                             | ...    | 14.5    | ...                                      | ...    | 15.4    | ...                                                         | ...    | .79     |
| ...                                            | 6.95    | ...  | ...                               | 5.8    | ...     | ...                                     | ...    | 20.4    | ...                                             | ...    | 14.5    | ...                                      | ...    | 15.2    | ...                                                         | ...    | .83     |
| 7.1                                            | 7.85    | 5.65 | 5.65                              | 5.65   | 21.1    | 20.2                                    | 20.65  | 15.1    | 14.5                                            | 14.8   | 14.9    | 14.8                                     | 14.85  | .80     | .74*                                                        | .77    |         |
| ...                                            | 7.6     | ...  | ...                               | 5.7    | ...     | ...                                     | 21.4   | ...     | ...                                             | 15.4   | ...     | ...                                      | 15.6   | ...     | ...                                                         | .75    |         |
| 7.1                                            | 7.17    | 5.4  | 5.35                              | 5.37   | 20.1    | 19.9                                    | 20.0   | 14.1    | ...                                             | 14.1   | 13.0    | ...                                      | 13.0   | .75*    | .75*                                                        | .75    |         |
| 6.95                                           | 7.25    | 5.8  | 5.35                              | 5.6    | 21.4    | 19.9                                    | 20.5   | 15.4    | 14.1                                            | 14.7   | 15.6    | 13.0                                     | 14.95  | .83     | .74*                                                        | .77    |         |
| GROUP 2.—ANCIENT BUT NOT PRIMEVAL.—NON-CELTIC. |         |      |                                   |        |         |                                         |        |         |                                                 |        |         |                                          |        |         |                                                             |        |         |
| ...                                            | 7.5     | ...  | ...                               | 6.2    | ...     | ...                                     | 21.6   | ...     | ...                                             | 15.5   | ...     | ...                                      | 16.0   | ...     | ...                                                         | .83    |         |
| ...                                            | 7.0     | ...  | ...                               | 5.85   | ...     | ...                                     | 20.4   | ...     | ...                                             | 14.4   | ...     | ...                                      | 14.1   | ...     | ...                                                         | .83*   |         |
| ...                                            | 6.7     | ...  | ...                               | 5.6    | ...     | ...                                     | 19.5   | ...     | ...                                             | 13.4   | ...     | ...                                      | 13.9   | ...     | ...                                                         | .83*   |         |
| ...                                            | 7.2     | ...  | ...                               | 6.05   | ...     | ...                                     | 19.9   | ...     | ...                                             | 14.5   | ...     | ...                                      | 14.6   | ...     | ...                                                         | .84    |         |
| 6.7                                            | 7.1     | 6.2  | 5.6                               | 5.9    | 21.6    | 19.5                                    | 20.35  | 15.5    | 13.4                                            | 14.45  | 16.0    | 13.9                                     | 14.65  | .84     | .83                                                         | .83*   |         |
| GROUP 3.—ANCIENT BUT NOT PRIMEVAL.—CELTIC.     |         |      |                                   |        |         |                                         |        |         |                                                 |        |         |                                          |        |         |                                                             |        |         |
| 7.1                                            | 7.24    | 5.8  | 5.35                              | 5.53   | 20.9    | 20.0                                    | 20.45  | 16.2    | 14.0                                            | 14.9   | 16.0    | 13.8                                     | 15.0   | .81     | .73                                                         | .77    |         |
| 7.4                                            | 7.47    | 5.7  | 5.5                               | 5.6    | 21.0    | 20.7                                    | 20.8   | 15.3    | 14.4                                            | 14.85  | 15.4    | 14.0                                     | 14.77  | .77*    | .74                                                         | .75*   |         |
| ...                                            | 8.2     | ...  | ...                               | 5.5    | ...     | ...                                     | 22.0   | ...     | ...                                             | 16.3   | ...     | ...                                      | ...    | ...     | ...                                                         | .67*   |         |
| ...                                            | 7.25    | ...  | ...                               | 5.5    | ...     | ...                                     | 20.3   | ...     | ...                                             | 14.1   | ...     | ...                                      | 14.6   | ...     | ...                                                         | .77    |         |
| ...                                            | 7.5     | ...  | ...                               | 5.4    | ...     | ...                                     | 20.5   | ...     | ...                                             | 15.1   | ...     | ...                                      | 15.0   | ...     | ...                                                         | .72    |         |
| 7.1                                            | 7.22    | 6.0  | 5.6                               | 5.8    | 21.4    | 20.4                                    | 20.95  | 14.8    | 14.5                                            | 14.65  | 15.6    | 14.0                                     | 14.8   | .82*    | .79                                                         | .80*   |         |
| ...                                            | 7.0     | ...  | ...                               | 5.5    | ...     | ...                                     | 20.0   | ...     | ...                                             | 14.3   | ...     | ...                                      | ...    | ...     | ...                                                         | .79    |         |
| 7.0                                            | 7.34    | 6.0  | 5.4                               | 5.57   | 22.0    | 20.0                                    | 20.6   | 16.3    | 14.1                                            | 14.85  | 15.4    | 14.0                                     | 15.55  | .82*    | .72                                                         | .76*   |         |
| GROUP 4.—MODERN.—CELTIC.                       |         |      |                                   |        |         |                                         |        |         |                                                 |        |         |                                          |        |         |                                                             |        |         |
| ...                                            | 7.3     | ...  | ...                               | 5.25   | ...     | ...                                     | 20.6   | ...     | ...                                             | 15.2   | ...     | ...                                      | 15.2   | ...     | ...                                                         | .72    |         |
| ...                                            | 7.1     | ...  | ...                               | 5.2    | ...     | ...                                     | 19.9   | ...     | ...                                             | 14.6   | ...     | ...                                      | 14.1   | ...     | ...                                                         | .73*   |         |
| 7.1                                            | 7.3     | 5.8  | 5.4                               | 5.5    | 21.3    | 20.1                                    | 20.7   | 15.5    | 14.6                                            | 15.0   | 15.6    | 14.1                                     | 14.9   | .81     | .74                                                         | .76    |         |
| 7.1                                            | 7.3     | 5.7  | 5.6                               | 5.63   | 21.5    | 20.5                                    | 20.9   | 15.5    | 14.6                                            | 15.0   | 15.1    | 14.9                                     | 14.96  | .79     | .76                                                         | .77    |         |
| 6.9                                            | 7.2     | 5.7  | 5.3                               | 5.5    | 22.0    | 19.8                                    | 20.5   | 15.5    | 13.9                                            | 14.8   | 15.0    | 14.0                                     | 14.5   | .78     | .74*                                                        | .76    |         |
| 7.2                                            | 7.5     | 5.7  | 5.3                               | 5.5    | 22.0    | 21.0                                    | 21.1   | 16.0    | 14.8                                            | 15.4   | 15.4    | 14.9                                     | 15.1   | .76     | .72                                                         | .74    |         |
| ...                                            | 8.0     | ...  | ...                               | 5.2    | ...     | ...                                     | 21.7   | ...     | ...                                             | 16.5   | ...     | ...                                      | 14.0   | ...     | ...                                                         | .65    |         |
| ...                                            | 7.3     | ...  | ...                               | 5.5    | ...     | ...                                     | 20.8   | ...     | ...                                             | 14.5   | ...     | ...                                      | 14.1   | ...     | ...                                                         | .75*   |         |
| 7.3                                            | 7.3     | 5.5  | 5.5                               | 5.5    | 20.6    | 20.6                                    | 20.6   | 14.9    | 14.7                                            | 14.8   | 15.1    | 14.5                                     | 14.8   | .75*    | .74*                                                        | .75*   |         |
| ...                                            | 7.5     | ...  | ...                               | 5.5    | ...     | ...                                     | 20.9   | ...     | ...                                             | 15.5   | ...     | ...                                      | 14.4   | ...     | ...                                                         | .74    |         |
| 6.9                                            | 7.3     | 5.9  | 5.2                               | 5.5    | 21.7    | 19.8                                    | 20.78  | 16.5    | 13.9                                            | 15.04  | 15.6    | 14.0                                     | 14.68  | .81     | .65                                                         | .75    |         |
| 6.6                                            | 7.23    | 5.8  | 5.1                               | 5.42   | ...     | ...                                     | ...    | ...     | ...                                             | ...    | ...     | ...                                      | ...    | .81     | .69                                                         | .75    |         |
| 6.6                                            | 7.26    | 5.9  | 5.1                               | 5.45   | ...     | ...                                     | ...    | ...     | ...                                             | ...    | ...     | ...                                      | ...    | .81     | .65                                                         | .75    |         |

# No. 3.—TABULAR VIEW OF THE DIMENSIONAL RANGE OF THE SEVERAL GROUPS.

| CUBIC CAPACITY. |        |     |     |     | ABSOLUTE LENGTH,<br>IN INCHES. |        |     |     |     | ABSOLUTE BREADTH,<br>IN INCHES. |        |     |     |     | PROPORTIONAL BREADTH,<br>IN 100ths OF LONG DIAMETER. |        |     |     |     |
|-----------------|--------|-----|-----|-----|--------------------------------|--------|-----|-----|-----|---------------------------------|--------|-----|-----|-----|------------------------------------------------------|--------|-----|-----|-----|
| Inches.         | GROUP. |     |     |     | Inches<br>in<br>tenths.        | GROUP. |     |     |     | Inches<br>in<br>tenths.         | GROUP. |     |     |     | 100ths.                                              | GROUP. |     |     |     |
|                 | 1      | 2   | 3   | 4   |                                | 1      | 2   | 3   | 4   |                                 | 1      | 2   | 3   | 4   |                                                      | 1      | 2   | 3   | 4   |
| 75              | ...    | ... | ... | 1   | 6.6                            | ...    | ... | ... | 3   | 5.1                             | ...    | ... | ... | 6   | .65                                                  | ...    | ... | ... | 1   |
| 76              | ...    | ... | ... | 1   | 7                              | ...    | 1   | ... | 3   | 2                               | ...    | ... | ... | 7   | .66                                                  | ...    | ... | ... | ... |
| 77              | 1      | 1   | ... | ... | 8                              | ...    | ... | ... | 1   | 3                               | 2      | ... | 1   | 13  | .67                                                  | ...    | ... | 1   | 1   |
| 79              | ...    | ... | 1   | ... | 9                              | 1      | ... | ... | 2   | 4                               | ...    | ... | 4   | 12  | .68                                                  | ...    | ... | ... | ... |
| 80              | ...    | ... | 1   | 1   | 7.0                            | ...    | 1   | 1   | 3   | 5                               | ...    | ... | 5   | 12  | .69                                                  | ...    | ... | ... | 3   |
| 81              | ...    | ... | ... | 1   | 1                              | 3      | ... | 5   | 7   | 6                               | 3      | 1   | 3   | 14  | .70                                                  | ...    | ... | ... | ... |
| 82              | ...    | ... | 2   | ... | 2                              | 1      | 1   | 3   | 14  | 7                               | 1      | ... | 2   | 7   | .71                                                  | ...    | ... | ... | 2   |
| 83              | ...    | ... | 1   | ... | 3                              | ...    | ... | 1   | 13  | 8                               | 1      | 1   | 2   | 3   | .72                                                  | ...    | ... | 1   | 4   |
| 84              | ...    | ... | ... | 2   | 4                              | ...    | ... | 3   | 9   | 9                               | ...    | ... | ... | 1   | .73                                                  | ...    | ... | 1   | 6   |
| 85              | ...    | ... | ... | 2   | 5                              | ...    | 1   | 3   | 9   | 6.0                             | ...    | 1   | 1   | ... | .74                                                  | 1      | ... | 2   | 12  |
| 86              | ...    | 1   | 1   | ... | 6                              | 2      | ... | 1   | 6   | 1                               | ...    | ... | ... | ... | .75                                                  | 3      | ... | 1   | 14  |
| 87              | ...    | ... | 3   | 3   | 7                              | ...    | ... | ... | 2   | 2                               | ...    | 1   | ... | ... | .76                                                  | ...    | ... | 2   | 11  |
| 88              | ...    | ... | ... | 2   | 8                              | ...    | ... | ... | 2   | ...                             | ...    | ... | ... | ... | .77                                                  | ...    | ... | 4   | 11  |
| 89              | ...    | ... | 1   | ... | 9                              | ...    | ... | ... | ... | ...                             | ...    | ... | ... | ... | .78                                                  | ...    | ... | 2   | 4   |
| 90              | 1      | 1   | ... | 1   | 8.0                            | ...    | ... | ... | 1   | ...                             | ...    | ... | ... | ... | .79                                                  | 1      | ... | 2   | 3   |
| 91              | 1      | ... | ... | 2   | 1                              | ...    | ... | ... | ... | ...                             | ...    | ... | ... | ... | .80                                                  | 1      | ... | ... | 1   |
| 92              | ...    | ... | 1   | 2   | 2                              | ...    | ... | 1   | ... | ...                             | ...    | ... | ... | ... | .81                                                  | ...    | ... | 1   | 2   |
| 93              | 1      | ... | ... | ... | ...                            | ...    | ... | ... | ... | ...                             | ...    | ... | ... | ... | .82                                                  | ...    | ... | 1   | ... |
| 94              | ...    | ... | ... | 1   | ...                            | ...    | ... | ... | ... | ...                             | ...    | ... | ... | ... | .83                                                  | 1      | 3   | ... | ... |
| 95              | 1      | ... | ... | 1   | ...                            | ...    | ... | ... | ... | ...                             | ...    | ... | ... | ... | .84                                                  | ...    | 1   | ... | ... |
| 96              | ...    | 1   | 1   | ... | ...                            | ...    | ... | ... | ... | ...                             | ...    | ... | ... | ... | ...                                                  | ...    | ... | ... | ... |
| 97              | ...    | ... | ... | 1   | ...                            | ...    | ... | ... | ... | ...                             | ...    | ... | ... | ... | ...                                                  | ...    | ... | ... | ... |
| 98              | ...    | ... | ... | 1   | ...                            | ...    | ... | ... | ... | ...                             | ...    | ... | ... | ... | ...                                                  | ...    | ... | ... | ... |
| 99              | ...    | ... | 2   | ... | ...                            | ...    | ... | ... | ... | ...                             | ...    | ... | ... | ... | ...                                                  | ...    | ... | ... | ... |
| 100             | ...    | ... | ... | 2   | ...                            | ...    | ... | ... | ... | ...                             | ...    | ... | ... | ... | ...                                                  | ...    | ... | ... | ... |
| 102             | ...    | ... | 1   | ... | ...                            | ...    | ... | ... | ... | ...                             | ...    | ... | ... | ... | ...                                                  | ...    | ... | ... | ... |
| 105             | ...    | ... | 1   | ... | ...                            | ...    | ... | ... | ... | ...                             | ...    | ... | ... | ... | ...                                                  | ...    | ... | ... | ... |
| 107             | ...    | ... | ... | 1   | ...                            | ...    | ... | ... | ... | ...                             | ...    | ... | ... | ... | ...                                                  | ...    | ... | ... | ... |
| No.             | 5      | 4   | 16  | 25  | No.                            | 7      | 4   | 18  | 75  | No.                             | 7      | 4   | 18  | 75  | No.                                                  | 7      | 4   | 18  | 75  |

## No. 4.—Tabular View of the Vertical Extension of 26 unclassified, but chiefly Celtic Crania, at angular intervals of 10 Degrees; and of the Angular Range of their Frontal, Parietal, and Occipital Bones, from the Naso-Frontal Suture to the Posterior Margin of the Foramen Magnum.

| FRONTAL BONE.                                    |       |     |     |      |      |      | PARIETAL BONE.                      |      |     |     |      |      |      | OCCIPITAL BONE.                     |      |     |      |      |     |      |
|--------------------------------------------------|-------|-----|-----|------|------|------|-------------------------------------|------|-----|-----|------|------|------|-------------------------------------|------|-----|------|------|-----|------|
| Range, 58° to 68°. Average, 63°.6                |       |     |     |      |      |      | Range, 115° to 133°. Average, 123°. |      |     |     |      |      |      | Range, 175° to 194°. Average, 184°. |      |     |      |      |     |      |
| Degrees                                          | ...   | 0   | 10  | 20   | 30   | 40   | 50                                  | 60   | 70  | 80  | 90   | 100  | 110  | 120                                 | 130  | 140 | 150  | 160  | 170 | 180  |
| Length of Radius in hundredths of Long Diameter. |       |     |     |      |      |      |                                     |      |     |     |      |      |      |                                     |      |     |      |      |     |      |
| Highest                                          | ...   | .58 | .60 | .64  | .69  | .70  | .72                                 | .72  | .72 | .72 | .73  | .71  | .67  | .63                                 | .61  | .59 | .54  | .49  | .38 | .33  |
| Lowest                                           | ..... | .47 | .50 | .52  | .54  | .55  | .56                                 | .56  | .57 | .59 | .60  | .62  | .59  | .56                                 | .54  | .50 | .43  | .34  | .22 | .16  |
| Average                                          | ....  | .50 | .51 | .596 | .623 | .639 | .643                                | .644 | .65 | .66 | .664 | .653 | .627 | .595                                | .575 | .54 | .493 | .424 | .32 | .252 |